
THE GEORGE WASHINGTON UNIVERSITY GRADUATE PROGRAMS BULLETIN

2009-2010

GEORGE WASHIN

Information in this Bulletin is generally accurate as of fall 2008. The University reserves the right to change courses, programs, fees, and the academic calendar, or to make other changes deemed necessary or desirable, giving advance notice of change when possible.

Program information appears under the name of the department or program concerned in Columbian College of Arts and Sciences. For the School of Business, the Graduate School of Education and Human Development, the Elliott School of International Affairs, and the School of Engineering and Applied Science, program information appears under the school's entry.

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THE ACADEMIC CALENDAR 2009–2010

August 2009							September 2009							October 2009							November 2009							
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	
						1			1	2	3	4	5						1	2	3	1	2	3	4	5	6	7
2	3	4	5	6	7	8	6	7	8	9	10	11	12	4	5	6	7	8	9	10	8	9	10	11	12	13	14	
9	10	11	12	13	14	15	13	14	15	16	17	18	19	11	12	13	14	15	16	17	15	16	17	18	19	20	21	
16	17	18	19	20	21	22	20	21	22	23	24	25	26	18	19	20	21	22	23	24	22	23	24	25	26	27	28	
23	24	25	26	27	28	29	27	28	29	30				25	26	27	28	29	30	31	29	30						
30	31																											
December 2009							January 2010							February 2010							March 2010							
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	
			1	2	3	4	5						1	2		1	2	3	4	5	6		1	2	3	4	5	6
6	7	8	9	10	11	12	3	4	5	6	7	8	9	7	8	9	10	11	12	13	7	8	9	10	11	12	13	
13	14	15	16	17	18	19	10	11	12	13	14	15	16	14	15	16	17	18	19	20	14	15	16	17	18	19	20	
20	21	22	23	24	25	26	17	18	19	20	21	22	23	21	22	23	24	25	26	27	21	22	23	24	25	26	27	
27	28	29	30	31			24	25	26	27	28	29	30	28							28	29	30	31				
							31																					
April 2010							May 2010							June 2010							July 2010							
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	
					1	2	3						1			1	2	3	4	5						1	2	3
4	5	6	7	8	9	10	2	3	4	5	6	7	8	6	7	8	9	10	11	12	4	5	6	7	8	9	10	
11	12	13	14	15	16	17	9	10	11	12	13	14	15	13	14	15	16	17	18	19	11	12	13	14	15	16	17	
18	19	20	21	22	23	24	16	17	18	19	20	21	22	20	21	22	23	24	25	26	18	19	20	21	22	23	24	
25	26	27	28	29	30		23	24	25	26	27	28	29	27	28	29	30				25	26	27	28	29	30	31	
							30	31																				

2009 Fall Semester

- August 31* Classes begin
- September 5–7* Labor Day weekend (holiday)
- Aug. 31–Sept. 10* Late registration
- October 1* Applications due for winter graduation
- November 4* Registration for spring semester classes begins*
- November 26–27* Thanksgiving holiday
- December 7* Last day of regular fall semester classes
- December 8* Makeup classes
- December 9–10* Reading period
- December 11–19* Examination period

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2010 Spring Semester

<i>January 11</i>	Classes begin
<i>January 11–21</i>	Late registration
<i>January 18</i>	Martin Luther King, Jr., Day (holiday)
<i>February 1</i>	Applications due for May graduation
<i>February 15</i>	George Washington's birthday observed (holiday)
<i>March 15–20</i>	Spring recess
<i>March 24</i>	Registration for fall semester classes begins*
<i>April 27</i>	Makeup classes
<i>April 28</i>	Designated Monday
	Last day of regular spring semester classes
<i>April 29–30</i>	Reading days
<i>May 3–11</i>	Examination period
<i>May 16</i>	Commencement

*Registration dates are tentative; consult the Schedule of Classes.

The University

PRESIDENTS OF THE UNIVERSITY

1821–1827	William Staughton
1828–1841	Stephen Chapin
1843–1854	Joel Smith Bacon
1855–1858	Joseph Getchell Binney
1859–1871	George Whitefield Samson
1871–1894	James Clarke Welling

1894–1895	Samuel Harrison Greene, <i>Acting</i>
1895–1900	Benaiah L. Whitman
1900–1902	Samuel Harrison Greene, <i>Acting</i>
1902–1910	Charles Willis Needham
1910–1918	Charles Herbert Stockton
1918–1921	William Miller Collier
1921–1923	Howard L. Hodgkins, <i>ad interim</i>
1923–1927	William Mather Lewis
1927–1959	Cloyd Heck Marvin
1959–1961	Oswald Symister Colclough, <i>Acting</i>
1961–1964	Thomas Henry Carroll
1964–1965	Oswald Symister Colclough, <i>Acting</i>
1965–1988	Lloyd Hartman Elliott
1988–2007	Stephen Joel Trachtenberg
2007–	Steven Knapp

ABOUT THE UNIVERSITY

George Washington was determined to have a great national university in the nation's capital. His hope was that students from all parts of the country would gain a first-hand knowledge of the practice as well as the theory of republican government while being instructed in the arts and sciences. He bequeathed 50 shares of The Potomac Company "towards the endowment of a University to be established within the limits of the District of Columbia, under the auspices of the General Government, if that government should incline to extend a fostering hand towards it." Despite Washington's intentions, The Potomac Company folded and Congress never

extended a “fostering hand,” so the University did not take shape until a group of Baptist clergymen led by Reverend Luther Rice took up the cause. They raised funds for the purchase of a site and petitioned Congress for a charter. Congress insisted on giving the institution a nonsectarian charter stating “That persons of every religious denomination shall be capable of being elected Trustees; nor shall any person, either as President, Professor, Tutor, or pupil, be refused admittance into said College, or denied any of the privileges, immunities, or advantages thereof, for or on account of his sentiments in matters of religion.”

Columbian College, as it was originally named, took up residence on College Hill, a 46-acre tract between the present 14th and 15th Streets extending from Florida Avenue to Columbia Road. The name of the institution was changed in 1873 to Columbian University and in 1904 to The George Washington University.

By 1918, the University had moved to the Foggy Bottom neighborhood—between 19th and 24th Streets, south of Pennsylvania Avenue—in the heart of Washington, D.C. The more than 100 buildings are situated on 43 acres bordered by the White House, the John F. Kennedy Center for the Performing Arts, the State Department, and the World Bank, as well as numerous federal agencies, national galleries, and museums.

GW’s Virginia Campus, initiated for graduate studies, research projects, and professional development programs, is located along the high-tech corridor on Route 7, just to the west of Route 28, in Loudoun County. In 1998, GW established The George Washington University at Mount Vernon College; the Mount Vernon Campus is on Foxhall Road in Northwest Washington.

Currently, the University's enrollments total more than 25,000, of which 10,300 are undergraduates, about 14,000 are graduate and professional students, and some 800 are nondegree students. The students come from all 50 states and about 125 different countries.

Mission Statement

The George Washington University, an independent academic institution chartered by the Congress of the United States in 1821, dedicates itself to furthering human well-being. The University values a dynamic, student-focused community stimulated by cultural and intellectual diversity and built upon a foundation of integrity, creativity, and openness to the exploration of new ideas.

The George Washington University, centered in the national and international crossroads of Washington, D.C., commits itself to excellence in the creation, dissemination, and application of knowledge.

To promote the process of lifelong learning from both global and integrative perspectives, the University provides a stimulating intellectual environment for its diverse students and faculty. By fostering excellence in teaching, the University offers outstanding learning experiences for full-time and part-time students in undergraduate, graduate, and professional programs in Washington, D.C., the nation, and abroad. As a center for intellectual inquiry and research, the University emphasizes the linkage between basic and applied scholarship, insisting that the practical be grounded in knowledge and theory. The University acts as a catalyst for creativity in the arts, the sciences, and the professions by encouraging interaction among its students, faculty, staff, alumni, and the communities it serves.

The George Washington University draws upon the rich array of resources from the National Capital Area to enhance its educational endeavors. In return, the University, through its students,

faculty, staff, and alumni, contributes talent and knowledge to improve the quality of life in metropolitan Washington, D.C.

The Schools

The George Washington University includes nine academic units, as follows:

Columbian College of Arts and Sciences offers programs leading to the degrees of Bachelor of Arts, Bachelor of Science, Bachelor of Fine Arts, Master of Arts, Master of Fine Arts, Master of Forensic Sciences, Master of Public Administration, Master of Public Policy, Master of Science, Master of Philosophy, Doctor of Philosophy, and Doctor of Psychology.

The School of Medicine and Health Sciences offers programs leading to the degrees of Bachelor of Science in Health Sciences, Bachelor of Science in Nursing, Master of Science in Health Sciences, Master of Science in Nursing, Doctor of Nursing Practice, Doctor of Physical Therapy, and Doctor of Medicine.

The Law School offers programs leading to the degrees of Juris Doctor, Master of Laws, and Doctor of Juridical Science.

The School of Engineering and Applied Science offers undergraduate programs leading to the degrees of Bachelor of Science and Bachelor of Arts. Graduate programs lead to the degrees of Master of Science, Engineer, Applied Scientist, and Doctor of Philosophy.

The Graduate School of Education and Human Development offers programs leading to the degrees of Master of Arts in Education and Human Development, Master of Arts in Teaching, Master of Education, Education Specialist, and Doctor of Education.

The School of Business offers programs leading to the degrees of Bachelor of Accountancy, Bachelor of Business Administration, Master of Accountancy, Master of Business Administration, Master of Science in Finance, Master of Science in Information Systems

Technology, Master of Science in Project Management, Master of Tourism Administration, and Doctor of Philosophy.

The Elliott School of International Affairs offers programs leading to the degrees of Bachelor of Arts, Master of Arts, Master of International Policy and Practice, and Master of International Studies.

The School of Public Health and Health Services offers programs leading to the degrees of Bachelor of Science, Master of Science, Master of Public Health, Master of Health Services Administration, Specialist in Health Services Administration, and Doctor of Public Health.

The College of Professional Studies offers programs leading to the degrees of Associate in Professional Studies, Bachelor of Professional Studies, and Master of Professional Studies.

In addition to these degree programs, The University is authorized by its Board of Trustees to award the Associate in General Studies under particular circumstances.

Accreditation

The George Washington University is accredited by its regional accrediting agency, the Middle States Association of Colleges and Schools.

The University is on the approved list of the American Association of University Women and is a member of the College Board.

The Law School is a charter member of the Association of American Law Schools and is approved by the Section of Legal Education and Admissions to the Bar of the American Bar Association.

The School of Medicine and Health Sciences has had continuous approval by its accrediting body, which is currently the Liaison Committee on Medical Education, sponsored jointly by the American Medical Association and the Association of American Medical Colleges. The clinical

laboratory science program is accredited by the National Accrediting Agency for Clinical Laboratory Science. The Commission on Accreditation of Allied Health Education Programs has accredited the programs in sonography and physician assistant. The physical therapy program is accredited by the Commission on the Accreditation of Physical Therapist Education of the American Physical Therapy Association.

In the School of Public Health and Health Services, the public health programs have full accreditation from the Council on Education for Public Health. The program in health services administration is accredited by the Accrediting Commission on Education for Health Services Administration. The program in athletic training is accredited by the Commission on Accreditation of Athletic Training Education.

In the School of Engineering and Applied Science, the Bachelor of Science programs in civil, mechanical, electrical, and computer engineering are accredited by the Engineering Accreditation Commission of ABET, Inc. The Bachelor of Science computer science curriculum is accredited by the Computing Accreditation Commission of ABET, Inc.

The Graduate School of Education and Human Development is a charter member of the American Association of Colleges for Teacher Education and is accredited by the National Council for Accreditation of Teacher Education and the State Education Agency–Board of Education of the District of Columbia for its eligible master's, specialist, and doctoral degree programs; the master's programs in school counseling and clinical mental health counseling and the doctoral program in counseling are accredited by the Council for the Accreditation of Counseling and Related Educational Programs; the master's program in rehabilitation counseling is accredited by the Council on Rehabilitation Education.

The School of Business is a member of AACSB International—The Association to Advance Collegiate Schools of Business; the Association accredits its undergraduate and graduate business administration and accountancy programs. The programs in accountancy satisfy the educational requirements for the Certified Public Accountant and the Certified Management Accountant professional examinations.

The Elliott School of International Affairs is a member of the Association of Professional Schools of International Affairs.

In Columbian College of Arts and Sciences, the B.F.A. with a major in interior design is accredited by the Foundation for Interior Design Education Research. The Department of Chemistry is on the approved list of the American Chemical Society. The Department of Music is an accredited member of the National Association of Schools of Music. The Ph.D. program in clinical psychology in the Department of Psychology and the Psy.D. program in the Center for Professional Psychology are on the approved list of the American Psychological Association. The M.A. program in speech–language pathology is accredited by the Education and Training Board of the Boards of Examiners in Speech–Language Pathology and Audiology. The M.P.A. program is on the approved list of the National Association of Schools of Public Affairs and Administration.

The Board of Trustees of the University

The University is privately endowed and is governed by a Board of Trustees of which the President of the University is an *ex officio* member. Trustees who are GW alumni are indicated by an asterisk; a dagger indicates a graduate of Mount Vernon College before it became part of GW.

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The Schools

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Whealan, Charlotte Wise

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Pardavi-Horvath

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Associate Deans Janet Craig Heddesheimer, Robert Nicholas Ianacone, Joel Gomez (*Interim*)

School of Business—*Dean* Susan Phillips; *Senior Associate Dean* Prabir K. Bagchi; *Associate Deans* Mehmet Murat Tarimcilar, Lawrence G. Singleton, Krishna R. Kumar

Elliott School of International Affairs—*Dean* Michael E. Brown; *Associate Deans* Hugh Lecaine Agnew, David Alan Grier, Douglas Shaw; *Assistant Dean* Lisa Stephenson

School of Public Health and Health Services—*Interim Dean* Josef J. Reum; *Associate Deans* Rebecca Tyrrell Parkin, Katherine Louise Hunting, Blaine Parrish (*Acting*)

College of Professional Studies—*Dean* Kathleen M. Burke; *Senior Associate Dean* Ali Eskandarian; *Associate Deans* F. Christopher Arterton, Charles Cushman; *Assistant Dean* Constance A. Mokey

The Faculty Senate

In addition to the elected members listed below, the president of the University is *ex officio*; the executive vice president for academic affairs, the University registrar, and the deans of the schools are administrative members; and a parliamentarian is selected by the Faculty Senate. In general, only primary appointments are listed below.

Arthur Edward Wilmarth, Jr., *Professor of Law and Chair of the Executive Committee*

John Martin Artz, *Associate Professor of Information Systems and Technology Management*

William H. Becker, *Professor of History*

Lisa M. Benton-Short, *Associate Professor of Geography*

Brian L. Biles, *Professor of Health Policy*

Michael Scott Castleberry, *Professor of Special Education*

Joseph John Cordes, *Professor of Economics and International Affairs*

Michael D. Corry, *Associate Professor of Educational Technology*

David P. Costanza, *Associate Professor of Psychology and Organizational Sciences*

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Ernest J. Englander, *Associate Professor of Strategic Management and Public Policy*

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Robert Warren Rycroft, *Professor of International Science and Technology Policy*

Gary Leonard Simon, *Professor of Medicine*

Richard Windsor, *Professor of Prevention and Community Health*

Philip William Wirtz, *Professor of Decision Sciences and of Psychology*

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FEES AND FINANCIAL REGULATIONS

The following fees and financial regulations were adopted for on-campus programs for the academic year 2009–10. Information on tuition and fees for Virginia Campus, off campus, and

summer programs can be found at the following websites: www.gwvirginia.gwu.edu, www.cps.gwu.edu, and www.gwu.edu/summer, respectively.

Tuition Fees

For students enrolled in graduate degree programs on the main campus in Columbian College of Arts and Sciences, the School of Business (excluding the four programs indicated immediately below), the Graduate School of Education and Human Development, the School of Engineering and Applied Science, and the Elliott School of International Affairs: Tuition is charged at the rate of \$1,118 per credit hour. In the School of Business, the Master of Business Administration and Master of Science in Finance are charged at the rate of \$1,208 per credit hour, doctoral study is charged at the rate of \$15,572 for two semesters, and the comprehensive charge for the Executive Master of Business Administration is \$80,852, paid at the rate of \$20,213 for four semesters. Nondegree students taking courses on the main campus are charged \$1,157 per credit hour.

Student Association Fee—For new students enrolling in Fall 2008 or later, \$1.50 per credit hour to a maximum of \$22.50 per semester. For students who first enrolled prior to Fall 2008, \$1 per credit hour to a maximum of \$15 per semester. The fee is nonrefundable.

Voluntary Library Fee—Each semester, the Registration Schedule and Invoice includes a voluntary gift for the University libraries. Check the box labeled “Library Gift Decline” and omit the amount from your payment if you do not wish to include the library gift in your reimbursement to the University.

Continuing Research—All master’s and doctoral students who have completed their required number of credits (including course work and thesis or dissertation research) must

register each subsequent fall and spring semester for 1 credit hour of Continuing Research as specified by the regulations of the school concerned.

Additional Course Fees—Some courses carry additional fees, such as laboratory or material fees, charged by semester as indicated in course descriptions. The amount appears in the Schedule of Classes.

Special Fees and Deposits (Nonrefundable)

Application fee	\$60
Late registration beginning the first day of the semester	80
Registration for continuous enrollment or leave of absence	35
Registration for Virginia campus and off-campus courses	35
Graduation fee	100
Late application for graduation (see Calendar)	35
Late payment fee (see Past Due Accounts, below)	75
Late authorization fee for third-party payment (see Third-Party Payment, below)	100
Returned check fee, charged a student whose check is improperly drafted, incomplete, or returned by the bank for any reason	35
Elliott School of International Affairs fee (payable over four semesters [fall and spring] at \$900 per semester for M.A. candidates and over two semesters [fall and spring] at \$1,800 per semester for M.I.P.P. candidates)	3,600
Engineers' Council fee (charged all SEAS students), per semester	8
English test for international students (when required)	20

Transcript fee	5
Replacement of lost or stolen picture identification card	25
Replacement of diploma	50

Payment of tuition for thesis or dissertation research entitles the candidate, during the period of registration, to the advice and direction of the member of the faculty under whom the thesis or dissertation is to be written. Accepted dissertations and theses are submitted electronically; the student pays a processing fee directly to Proquest/UMI.

Postdoctoral Study—Those who have graduated from George Washington University with a Ph.D., Ed.D., or D.Sc. may continue any studies in the University without payment of tuition (contingent upon the availability of space) and may enjoy all University library privileges. Such graduates pay the prevailing charge for one credit hour in order to establish their active membership in the University. The use of laboratory space and equipment is contingent upon availability, and the cost of all laboratory or special library material is paid by the graduate. Special arrangements for such privileges must be made with the dean two months in advance of the semester in which the graduate wishes to register. Postdoctoral work taken under this privilege may not be taken for credit.

Payment of Fees

A student who registers for classes in any semester or session incurs a financial obligation to the University. Payment of tuition and fees is due upon receipt of the Schedule and Invoice or at the time of registration. Except for students on the monthly payment plan, tuition is to be paid in full by the first day of the semester or upon registration if registration is after the first day of the semester. The University reserves the right to revoke the registration, effective to the beginning of the semester, of any student who fails to make full payment. Students whose registrations

have been revoked or canceled for failure to make timely payments are not permitted to attend class and may not occupy University housing.

Monthly Payment Plan—This payment plan is open to all students and is available for the fall and spring semesters only. Students must complete and submit an application by August 15 for the academic year or by January 5 for the spring semester to participate in the plan. Upon approval of the application, the student will be billed for each payment. The monthly payment plan for the academic year begins in June and ends in March, with the first five payments applied to the fall account and the second five applied to spring. For spring semester only, the plan begins in November and ends in March. Under the plan, all payments are due on the first of each month. The student will receive a monthly bill, but no interest or late fees will be charged provided payments are received as scheduled. Students who enroll in the plan after the first month must make up all payments to the month of enrollment. Interest and a late payment fee are assessed all accounts not paid in full by October 5 for fall and March 5 for spring. An outside vendor administers the plan and charges a one-time participation fee in addition to interest and late fees for any payments received late. For more information, see colonialcentral.gwu.edu/billing/paying.

Third-Party Payment—The University accepts employer vouchers or purchase orders that are not contingent upon receipt of grades. Under all circumstances, the charges for tuition and fees remain the responsibility of the student. Authorization from a sponsor to be billed for a student's charges must be received in the Student Accounts Office by the end of the third week of the fall or spring semester. A late authorization fee may be incurred for responses received after these times. Bills are mailed to sponsors in October for the fall semester and in February for the spring semester. Should a sponsor fail to remit payment to the University, the University will

contact the student for payment. Students whose employers or sponsors reimburse them for tuition and fees after receipt of grades must pay in full upon receipt of the Schedule and Invoice or at the time of registration to avoid interest, late fees, and/or cancellation of registration.

Students whose tuition is paid in full or part by employee benefits or teacher tuition remission must pay any remaining balance by the stated due date to avoid interest, late fees, and/or cancellation of registration.

Past Due Accounts—Accounts that are past due are encumbered by the University. A student whose account is encumbered may not register for future semesters and may not receive diplomas or transcripts. Late payment fees and interest may also be assessed each month that the account has an overdue outstanding balance. Please see the University's Tuition Payment Disclosure Statement at colonialcentral.gwu.edu/billing/disclosures for more information on those fees and billing practices. Accounts that are more than 90 days past due are referred to an agency and/or attorney for collection. The student is then responsible for all charges, costs, and fees due to, or incurred by, the University as well as all costs, fees, and charges incurred by the agency and/or attorney, including attorney's fees. Students whose registrations have been revoked or canceled for failure to make timely payments are not permitted to attend class and may not occupy University housing.

Dishonored/Returned Checks—A student whose check is returned unpaid by the bank for any reason will be charged a returned check fee and will be responsible for any associated costs and/or attorney's fees incurred by the University should a civil lawsuit or other collection effort be instituted to collect on such dishonored check. In any case where the University has reason to believe that a student presented a dishonored check in bad faith, the University may, in addition to any collection efforts, refer the matter to the proper authorities for criminal prosecution.

Withdrawals and Refunds

Applications for withdrawal from the University or from a course after the registration period must be made in accordance with procedures outlined under University Regulations in the sections Complete Withdrawal From the University, and Adding and Dropping Courses, respectively. Financial aid recipients must notify the Office of Student Financial Assistance in writing.

In authorized withdrawals and changes in schedule, cancellations of semester tuition charges and fees will be made in accordance with the following schedule for the fall and spring semesters:

1. *Complete withdrawal from all courses (on-campus students):*

Withdrawal dated on or before the end of the first week of the semester	90%
Withdrawal dated on or before the end of the second week of the semester	60%
Withdrawal dated on or before the end of the third week of the semester	40%
Withdrawal dated on or before the end of the fourth week of the semester	25%
Withdrawal dated after the fourth week of the semester	None

2. *Partial withdrawal:* If the change in program results in a lower tuition charge, the refund schedule above applies to the difference.

3. Regulations governing student withdrawals as they relate to residence hall and food service charges are contained in the specific lease arrangements.

4. *Summer Sessions*: In cases of authorized withdrawals from courses, refunds of 85% of tuition and fees will be made for courses dropped within the first seven calendar days of the start of a session. No refund will be made for courses dropped thereafter.

Courses that do not follow the traditional semester may have different refund policies.

The above information regarding cancellation of tuition charges and fees after withdrawal from the University may not apply to entering students who are recipients of federal aid; those students should check with the Student Accounts Office for the applicable cancellation schedule. Refund policies of the University are in conformity with guidelines for refunds as adopted by the American Council on Education. Federal regulations require that financial aid recipients use such refunds to repay financial aid received for that semester's attendance. This policy applies to institutional aid as well.

If a recipient of federal financial aid withdraws from the University or reduces his or her course load, federal regulations require that the University reevaluate the student's eligibility to determine the amount of aid the student is allowed to retain. If there is a credit balance on the student's account after the federal funds have been adjusted, institutional funds will be recovered from that amount.

In no case will tuition be reduced or refunded because of absence from classes. Authorization to withdraw and certification for work done will not be given a student who does not have a clear financial record.

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FINANCIAL AID

The George Washington University offers a program of financial support for students, which includes assistantships, fellowships, traineeships, graduate scholarships, research appointments,

part-time employment, the Federal Work–Study Program, and loans. Several forms of aid not based on financial need are available. In general, consideration for financial aid is restricted to students in good academic standing who meet the minimum grade-point average for particular awards and are not financially encumbered by any other University office.

The University reserves the right to ask for documentation necessary to determine aid eligibility. Documents submitted as part of aid applications become the property of the University and cannot be returned. Federal regulations require that the University report suspected cases of fraud or misrepresentation to the appropriate federal, state, and local authorities.

Gift aid (scholarships, grants, fellowships, assistantships, tuition awards, etc.) is taxable to the extent that it exceeds the allowable costs of tuition, fees, and required books and supplies or is dedicated to other costs, such as room and board. Federal grants may be taxable if, together with other gift assistance, they exceed the allowable costs.

Application and correspondence concerning assistantships, fellowships, traineeships, or graduate scholarships should be sent directly to the school concerned at The George Washington University. Unless otherwise specified, application and supporting credentials should be submitted no later than February 1 preceding the academic year for which the award is made. Application for admission to graduate study is a prerequisite for consideration.

Information in this section is accurate at the time this Bulletin is prepared for press. Future changes in federal regulations or institutional policies may alter the application requirements or program guidelines.

Office of Graduate Student Assistantships and Fellowships

The Office of Graduate Student Assistantships and Fellowships provides information on awards that may be used in support of graduate study. These awards are generally sponsored by foundations, professional and learned societies, industries, and other organizations.

Services are provided to entering and enrolled graduate students. Detailed information is available at www.gwu.edu/~fellows/fellows.

Assistantships

Research Assistantships—May be available in departments with faculty who are participating in sponsored research.

Graduate Teaching Assistantships—Available to graduate students in master's and doctoral programs in most departments of the University. A graduate teaching assistant receives financial compensation for a designated unit of service to the assistant's major department of instruction. All new graduate teaching assistants must attend an orientation program and enroll in an on-line course.

House Proctors—Available to graduate students in any field of study who are interested in working in University residence halls. Specific duties vary with the position, but basically consist of counseling, advising student groups, and administration. Remuneration includes salary and a furnished room for the academic year. All positions are part time, and staff members are required to enroll as full-time students in degree programs. Further information may be obtained from GW Housing Programs.

Fellowships, Scholarships, and Related Programs

University Fellowships—Available to graduate students in master's and doctoral programs in most departments of the University. Fellowships are based on scholarship and each fellow may receive a stipend and/or tuition allowance.

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Research Traineeships—Available under sponsored programs in a number of departments.

Awards vary; information is available from the departments.

Other Fellowships, Scholarships, and Related Programs

Achievement Rewards for College Scientists Scholarships

Angeline Anderson Scholarship Fund

Bank of America Fellowship

Robert R. Banville Scholarship Fund

Sylvén Seid Beck Endowment Fund for Elementary Education

Bell Atlantic Endowment Fellowships in Physics and Chemistry

Florence Bichan/Scottish Rite Scholarships

Mary Darnell Blaney Fellowship in International Relations

Winfield Scott Blaney Fellowship in International Relations

John and Claudia Boswell Scholarship Fund

Hortence Mae Boutell Scholarship in Fine Arts

David and Anne Elizon Brown Scholarship

Elizabeth V. Brown Scholarship Fund

Letitia Woods Brown Fellowship in American Studies

Joel T. Broyhill Scholarship

Doris and Sam Buchhalter Scholarship

Robert D. Campbell Endowment Fellowships in Geography

Career Development Fellowships

Oliver T. Carr, Jr., Fellowships

Center for Washington Area Studies Fellowship

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James Edward Miller Chapman Educational Foundation Scholarship

Chemistry Alumni Fellowship

Children's National Medical Center Fellowships in Biomedical Sciences

Daewoo Corporation Scholarships

Daewoo Vietnamese Scholarship

Daughters of the American Revolution (DAR) Endowment Fellowships

Maria Davis European Studies Fellowships

Vincent J. DeAngelis Scholarship Fund

Deixler/Swain Graduate Scholarship in History

Dockery Endowment Scholarship

Brian and Marianna Dwyer Fellowships

Eaton Scholarship

Eaves–Carden Graduate Scholarship

Engineering Alumni Association Fellowship

Evans Scholarship Fund in Art

Evans Scholarship Fund in Theatre and Dance

Rosetta and Sadie Feldman Endowment Fellowship

Fischer Family Fund

Rockwood H. Foster Memorial Scholarship Fund

James Harold Fox Scholarship Fund

Philip Friedlander, Jr., Scholarship in Entrepreneurship and Small Business Studies

Mary Hatwood Futrell Scholarship Fund

Jack Gerard Endowment Fellowship

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Global Leaders Fellowships

Leo and Lillian Goodwin Endowment Scholarship

Graduate Engineering Honors Fellowship Program

Graduate Student Engineering Scholarship

Mildred Green Memorial Endowment Fund

Griffith Family Scholarship Fund

GSPM Alumni Scholarship Fund

GSPM Faculty Scholarship Fund

Anna Spicker Hampel Scholarship

Corey Hansen Scholarship Fund

Evelyn Barstow Harrison Scholarship in Public Administration

Elizabeth Earle Heckmann Graduate Scholarship

Norris and Betty Hekimian Engineering Endowment

Herbst Family Graduate Fund

Thelma Hunt Graduate Fellowships in Psychology

Hyundai Scholarship Fund

Iran Research Fellowships

Douglas L. Jones Endowed Graduate Fellowship in Mechanical Engineering

Kylen and Heide Jones-Huffman Fund

Marvin L. Kay Fellowship in Finance

Kayser Fund Endowment in History

Rita H. Keller Scholarship Fund

Kellogg Graduate Scholarship

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John Whitefield Kendrick Graduate Fellowship in Economics

Isabella Osborn King Research Fellowships in Biological Sciences

Larry King Graduate Scholarship in Media and Public Affairs

Andrew John Knox Scholarship

Wolfgang and Astrid Kraus Graduate Scholarships

Lambert Graduate Stipend in Arts and Sciences

Laurence F. Lane Graduate Scholarship in Political Management

Levitan Endowment Fellowships

Myron L. Loe Graduate Student Scholarship

Loughran Foundation Fellowships

Loughran Oxford Fellowships

Mary and Daniel Loughran Graduate Scholarships

Morris Louis Fellowship in Painting

W. Stanley Machen Graduate Fellowship in Civil Engineering

J. Willard Marriott Foundation Graduate Scholarships

George McCandlish Fellowship in American Literature

McConnell Endowment in Chemistry

Dorothy A. Moore Graduate Scholarship Endowment for International Education

Dorothy and Charles Moore Fellowship in International Development Studies

James N. Mosél Scholarship Fund

National Council for Education and Human Development Endowed Scholarship Fund

National Institutes of Health Fellowships in the Biomedical Sciences

Wendy Anne Ochsman Endowment Scholarships

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Phi Delta Gamma Scholarships

Raymond L. Pickholtz Graduate Scholarship

Policy Studies Graduate Fellowships

Poncelet Scholarships

Presidential Merit Fellowships

Public Administration Faculty–Alumni Scholarship

Kelly J. Purcell Memorial Credit Union Scholarship in Political Management

Joan Roddy Regnell Fellowships in Speech and Hearing Science

Shirley H. and Robert L. Richards Scholarship Fund

Thomas Bradford Sanders Fellowships

Schwoerer Graduate Scholarship

Scottish Rite Graduate Endowment Fellowships

Scottish Rite Graduate Fellowships in Childhood Language Disorders

Bourdon F. Scribner Graduate Student Scholarship in Chemistry

Selective Excellence Endowment Fellowships

ServiceMaster Fellowship

J.B. and Maurice C. Shapiro Fellowships in International Affairs

Sickler Family Endowment Scholarship

Speech–Language Pathology Endowment Fellowships

Toccin Endowment Fellowship

Trachtenberg–Wang Teaching Fellowship

Turner Non-Profit Leadership Development Scholarship

General John W. Vessey Endowment Fellowships

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Vest Graduate Scholarship

Videtto Family Endowment Scholarship

Jack C. Voelpel Memorial Fund

Louis P. Wagman Endowment Scholarship in Engineering

Richard David Walk Endowment Scholarships in Psychology

Washington Gas and Light Scholarship

Helen Waters Endowed Scholarship

Ann Gordon Webster Endowment for Anthropology

Ronald Barbour Weintraub Research Fellowships in Biological Sciences

Ruth Ann Parker Wells Scholarship

Ruth Ann Parker Wells and David Leonard Wells Endowment Scholarship Fund

Katherine J. Williams Endowment Scholarships in Art Therapy

Wolcott Foundation Scholarships

Helen and Sergius Yakobson Graduate Scholarship

Loan Funds

Various lenders offer alternative loans as another option to meet educational expenses. Students should investigate all programs to determine which one meets their financial requirements and offers the best rates and repayment options. The loans allow students to borrow up to 100% of GW's annual graduate cost of attendance less any current financial assistance. More information can be obtained at our website gwired.gwu.edu/finaid.

Federal Stafford Loans—Graduate students enrolled at least half time may apply for subsidized Stafford Loan funds of up to \$8,500 per year, based on their need as determined by a federally mandated formula based on the Free Application for Federal Student Aid (FAFSA).

Stafford loans are fixed-rate loans, currently at 6.8%, with a repayment period up to 10 years; the government pays the interest while students are enrolled in school at least half time and for six months afterward. All graduate students may apply for an unsubsidized Stafford Loan up to \$20,500, less any subsidized amount received. Terms and conditions are the same, except that the student borrower is responsible for all interest that accrues on the unsubsidized amount during the in-school period; deferments are available. Graduate students must apply for, and be eligible for, a full subsidized Stafford Loan before their eligibility for a Federal Perkins Loan or Federal Work–Study will be determined.

Students must file the FAFSA to receive their information. In addition, students must submit the Loan Questionnaire for the current year and a completed Master Promissory Note application. Tax information for the current tax year (for example, 2008 for the 2009–2010 academic year) is required only for those selected for federal verification and for those who submit a Special Condition Form. Students who intend to use loan proceeds for payment of University charges at the time of registration should submit a loan application and all supporting documents to the Office of Student Financial Assistance by May 1 for the fall semester, October 1 for the spring semester, and March 1 for the summer sessions. Students may not borrow against or take out an emergency loan on their next semester's loan disbursement until the first day of classes for that term.

Graduate PLUS—The Graduate PLUS is a federally sponsored education loan for graduate students. A student is eligible to borrow up to the full cost of attendance, including tuition, fees, living, books, and transportation expenses, less any financial assistance received. The student must apply for the Stafford Loan and the amount of the Stafford Loan eligibility must be included in the calculation to determine the amount of the Graduate PLUS loan.

Graduate PLUS has a fixed interest rate of 8.5% that is set by the federal government, so the student can borrow throughout his/her education without any increase in the interest rate.

Detailed information on the application process can be found at gwired.gwu.edu/finaid.

Alternative Loans—Private lenders provide competitive alternative loan options to qualified students. These loans offer attractive interest rates and repayment options. The loans allow the student to borrow up to 100% of GW's annual graduate cost of attendance less any current financial assistance. More information can be found at gwired.gwu.edu/finaid.

Other Loan Funds—The following loan funds are available to degree students. Complete information regarding each loan fund is available from the Office of Student Financial Assistance (gwired.gwu.edu/colonialcentral): Jessie B. Martin Loan Fund; Jack and Anne Morton Loan Fund; Barney Plotnick, M.D., Student Loan Fund; Hiram Miller Stout Memorial Loan Fund; University Student Emergency Loan Fund; Edmund W. Dreyfuss Loan Fund; Peter and Doris Firsht Loan Fund. In addition, the Inner-City Special Student Assistance Loan Fund is available through the GW Multicultural Student Services Center.

Student Employment

The University participates in the Federal Work–Study Program. Inquiries should be addressed to the Office of Fellowships and Graduate Student Support. In addition, the Career Center maintains a registry of both full-time and part-time positions available in the Washington area for undergraduate and graduate students. After registration, students may apply at the Center for interviews and referrals to positions for which they are qualified.

International Students

International students applying for graduate teaching assistantships must have minimum TOEFL scores of 600 (paper-based) or 250 (computer-based) or 100 (Internet-based) or an overall band

score of 7.0 on the academic IELTS with no individual band score below 6.0. International students applying from outside the University may be appointed to graduate teaching assistantships but must successfully complete an orientation and evaluation program held prior to registration. Those found to have difficulties with English will be required to enroll in specified courses in English for Academic Purposes and/or will be referred to the Speech and Hearing Center's speech enhancement program; such students will be assigned nonteaching duties in place of classroom instruction. They will be reevaluated each semester; if they are not designated as qualified to give classroom instruction by the end of one academic year, the teaching assistantship will not be renewed.

Graduate students who are presently enrolled at GW and have been proposed as candidates for graduate teaching assistantships by their departments must pass the Test of English for Academic Purposes at the levels indicated above and will be required to complete successfully an oral interview and the orientation and evaluation program before they will be considered for graduate teaching assistantships.

Students who wish to study in the United States should have sufficient funds available to cover expenses for one full year before attempting to enter a college or university. The cost at this University for one academic year (September–May) was \$40,572 in 2008–09 for full-time students (9 credits per semester) and is expected to be higher in 2009–10; generally speaking, expenses for international students are about \$2,000 over the stated figure, which includes room and board, tuition, books, clothes, and incidental expenses, but not travel, holiday, or medical expenses.

Veterans Benefits

The Veterans Benefits office assists students entitled to educational benefits as active-duty personnel, veterans, or as widows or children of deceased or totally disabled veterans with any problems that may arise concerning their benefits. This office also processes certification of enrollment and attendance to the Veterans Administration so that educational allowances will be paid.

When feasible, students entitled to educational benefits as active-duty personnel, veterans, or dependents of veterans should consult with the veterans counselor prior to submitting applications to the Veterans Administration. All such students should obtain the instruction sheet issued by the veterans counselor; it sets forth requirements to be fulfilled before certification of enrollment can be made to the Veterans Administration and includes other information of general interest. Eligible students should be aware they must be admitted to a degree seeking program by the start of their third semester in order to continue receiving veterans benefits.

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STUDENT SERVICES

Office of the Dean of Students

The Office of the Dean of Students provides consultation and information for students, administers the nonacademic student disciplinary system and student grievance procedures, and assists in nonacademic program development. Staff members are well informed on University policies and the various student services provided on campus, enabling them to provide referrals and answers to many questions concerning general student life.

Housing

Information on GW's graduate student housing is available at living.gwu.edu. With a Metro stop on-campus, GW is easily accessible via public transportation. An off-campus housing resource

center is found at gradlife.gwu.edu/OffCampusHousing for listings, a mover's guide, neighborhood information, and on-line help.

Student Health Service

The Student Health Service is an outpatient clinic staffed by physicians, nurse practitioners, and physician assistants. Students can be evaluated and treated for most medical problems.

Psychiatrists are on staff to provide evaluation and referrals as well as crisis intervention. Visits should be arranged by appointment at gwired.gwu.edu/shs; urgent problems may be seen on a walk-in basis if necessary. Charges for visits, labwork, and medication apply. Health education and outreach programs on a variety of topics are provided throughout the year.

For serious emergencies occurring during hours when the Student Health Service is closed, students may go to the Emergency Room of the University Hospital for treatment. All fees are the responsibility of the student.

Students must be currently enrolled on campus in the University to receive treatment at the Student Health Service. Students enrolled in off-campus programs and continuing education programs are not eligible. The bills incurred from all services rendered outside of the Student Health Service (for example, x-ray work, laboratory work, and office visits to private physicians) are the responsibility of the student. Additional information is available at gwired.gwu.edu/shs.

Health and Accident Insurance

The University recommends that all students be covered by health and accident insurance. For information on health insurance offered through the University, contact United Healthcare at 1-800-767-0700 or www.uhcsr.com.

Immunization Requirements

It is the law in the District of Columbia that all students under the age of 26 have a record on file with the Student Health Service documenting immunity to measles, mumps, and rubella (two immunizations with the initial dose given after the first birthday or positive titers), varicella (chickenpox—by immunization, documented history of disease or positive titers), hepatitis B series, and a current tetanus/diphtheria booster (within 10 years prior to the beginning of the semester). This requirement applies to all students regardless of their program of study or degree status. Students registering for the first time will be able to do so without complete records on file, but any subsequent registration will be blocked if this requirement has not been fulfilled. Immunization forms are sent out by the GW admitting office. Forms can be downloaded from gwired.gwu.edu/shs. In addition to the required immunizations, the meningitis vaccine is recommended. The Student Health Service can give all inoculations on a fee for service basis. Further information is available at (202)994-6827.

University Counseling Center

University Counseling Center services help students address personal, social, career, and study problems that can interfere with their academic progress and success. Services include brief individual counseling, crisis intervention, group counseling, and workshops on topics such as time management, study skills, family and relationship issues, anxiety and stress management, self-esteem/personal growth, eating disorders, and adjustment to GW. The Center offers consultation and outreach programs for student, faculty, and staff groups. Further information about all services and links to psychoeducational materials can be obtained at gwired.gwu.edu/counsel. Information and referrals during business hours and after-hours emergency services are available at 202-994-5300.

Career Center

The Career Center promotes effective career planning, teaches job search strategies, and facilitates contacts between GW students, alumni, and prospective employers through its many services. Services include full- and part-time job listings; internship listings; career consulting; workshops (including job search strategies, cover letters and resumes, and effective interviewing); a career resource room; on-campus interviewing; resume critiques; facilitating the federal work–study program; cooperative education programs. Additional information is available at gwired.gwu.edu/career.

International Services Office

The International Services Office provides services to GW’s international students, scholars, faculty, and staff. The office provides advising on a variety of personal issues, including cultural adjustment, living conditions, academic concerns, and finances; provides immigration assistance and information on U.S. government requirements and regulations specific to the international community; conducts orientation programs to assist in living, studying, and working in the United States; and serves as a resource center for the University community on issues of cross-cultural understanding.

Disability Support Services

Disability Support Services (DSS) provides and coordinates accommodations and other services for students with a wide variety of disabilities, as well as those temporarily disabled by injury or illness. Accommodations are available through DSS to facilitate academic access for students with disabilities. To be eligible, a student must provide to DSS documentation that substantiates the need for such services in compliance with Section 504 of the Rehabilitation Act and the ADA. Services provided without charge to the student may include registration assistance, readers, interpreters, scribes, learning specialist services, adaptive materials and equipment,

assistance with note taking, laboratory assistance, test accommodations, and referrals. DSS does not provide content tutoring, although it is available on a fee basis from other campus resources. The University does not pay for personal attendant care. DSS is located on the 2nd floor of the Marvin Center and is open from 9 a.m. to 5 p.m. weekdays. Additional information is available at www.gwu.edu/~dss.

Multicultural Student Services Center

The Multicultural Student Services Center is a University-wide resource for multicultural information, communication, programs, and services. MSSC supports the academic, professional, personal, and spiritual growth of students in the multicultural community, while providing cultural education experiences and cross-cultural immersion and exposure for the entire campus community.

The Multicultural Student Services Center partners with student support service providers to help ensure that students of color are represented in every aspect of University life; integrated into the fabric of University life; engaged in utilizing the services of the University; graduating at a rate comparable to their peers; and connected with the University family for life. MSSC is a critical player in maintaining a campus community that fosters the understanding and appreciation of cultural difference to ensure that GW students are prepared for an increasingly diverse world of work.

Significant resources on multicultural speakers, internships, scholarships, and job opportunities, as well as periodicals, are maintained by MSSC.

Student Activities Center

The Student Activities Center furthers the educational mission of the University by offering programs, services, and facilities that foster the social and cultural development of students to

help build a sense of community within the entire University population. Staff members assist individual students and campus organizations with event planning, program coordination, and participation in special projects.

Programs and activities include registration, oversight, and advising of student organizations; planning and coordination of special events; Greek Life; and leadership development programs. Information about the many additional programs and services offered by the Student Activities Center can be obtained at gwired.gwu.edu/sac.

Program Board—The Program Board has the primary responsibility of allocating resources for student programming on campus. In addition, the Program Board provides funding and services for activities presented by various campus organizations and encourages student participation in program planning through involvement in committees on the arts, concerts, festivals, films, parties, political affairs, and public relations.

Student Government—The GW Student Association is made up of all full-time and part-time undergraduate and graduate students who are registered for academic credit on campus. A body of elected and appointed individuals is responsible for representing the interests of students at the University. The Student Association provides various services for students, such as academic evaluations, test and syllabus files, and student advocacy.

Student involvement in the governance of the University is also possible through participation in various administrative and Faculty Senate committees, advisory councils of the schools and college, selected committees of the Board of Trustees, and specialized bodies, such as the Residence Hall Association, the Joint Food Services Board, and the Marvin Center Governing Board. This involvement has helped develop policies and programs beneficial to students and to the University community as a whole.

Student Organizations—Students are encouraged to become involved with existing student organizations or to initiate their own. There are over 350 registered organizations on campus, covering a broad spectrum of interests, including academic, professional, international, cultural, political, service, sports, hobbies, recreational, religious, and meditative groups as well as social fraternities and sororities.

The Cloyd Heck Marvin Center

The Marvin Center is used by the GW community for conferences, celebrations, and special events, functioning as the center of student life on campus and hosting over 15,000 events and activities annually. The Center offers a wide range of retail services, including a variety of food and dining options, a travel office, a copy center, and the GW Bookstore. Additionally, the Marvin Center is home to Colonial Central, a hub for student financial services, and to some 50 student organization offices, including the Marvin Center Governing Board, the Student Association, the Program Board, and the Cherry Tree.

Religious Life

The University recognizes the contribution that religion makes to the life of its students and encourages them to participate in the religious organizations of their own choice. Local religious communities work in conjunction with student religious organizations. The advisors of the religious organizations are available for counseling and enhance religious life on campus. Religious services and special observances are also provided for the University community as announced.

Major Program Events

Art Exhibits—The work of locally, nationally, and internationally known artists is shown in exhibitions in the Luther W. Brady Art Gallery in the Media and Public Affairs Building.

Student art exhibits are presented each semester in the Dimock Gallery in Lisner Auditorium.

Concert Series—The Department of Music presents a series of concerts featuring faculty, guest, and student artists throughout each year. Other concerts are held regularly on campus.

Dance—The Department of Theatre and Dance presents major dance concerts, informal studio performances, experimental events, television appearances, and lecture–demonstrations. Students may audition to participate and have the opportunity to choreograph, perform, and gain experience in the technical aspects of dance productions.

Glee Club, Jazz Band, and Orchestra—The University Singers, University Band, Jazz Band, and Orchestra are available to students as credit courses or as cocurricular activities; major performances are presented to the University community several times a year, including regular winter and spring concerts. Chamber groups and jazz combos are regularly available for participation by all students.

Program Board—The University Program Board, through its various committees and in cooperation with other campus groups, regularly sponsors films, lectures, concerts, social activities, and special events.

Theatre—The Department of Theatre and Dance produces four major plays and musicals during the year on the proscenium/thrust stage in the Dorothy Betts Marvin Theatre. Additional works, including original and experimental plays, are produced in a more intimate studio theatre. Students can participate in all aspects of theatre and may receive credit toward their B.A. or M.F.A. degrees for some of their production work.

Athletics, Recreation, and Intramurals

The Lerner Family Health and Wellness Center offers students many options for physical activities, including courts for basketball and volleyball; courts for racquetball and squash; a jogging track; a swimming pool; and a cardio and free weight room. A broad program of intramural and recreational activities is held in the Lerner Family Health and Wellness Center designed to accommodate various levels of skill, experience, and interest. The Mount Vernon campus is home to an artificial-turf soccer/lacrosse/field hockey facility, a softball field, and 11 tennis courts.

The University is a member of the National Collegiate Athletic Association (NCAA), the Eastern College Athletic Conference (ECAC), and the Atlantic 10 Conference. Its intercollegiate varsity teams compete against major universities throughout the region and nation in such sports as basketball, baseball, soccer, lacrosse, softball, squash, tennis, golf, cross-country, crew, swimming and diving, water polo, volleyball, and gymnastics. The Charles E. Smith Center is home to these intercollegiate varsity teams, which use the facility for practices as well as intercollegiate games, matches, and meets.

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OTHER SCHOOLS, PROGRAMS, AND SERVICES

The major sections that follow describe the graduate programs and courses offered by Columbian College of Arts and Sciences, the School of Business, the Graduate School of Education and Human Development, the School of Engineering and Applied Science, the Elliott School of International Affairs, and the College of Professional Studies. This section briefly indicates the University's other schools and some additional programs, services, and administrative units.

Other Schools of the University

Graduate and professional degrees offered by schools of the University that are not part of this Bulletin include the following. In the Law School—the Juris Doctor, Master of Laws, and Doctor of Juridical Science (see www.law.gwu.edu). In the School of Public Health and Health Services—the Master of Public Health, Master of Science, Master of Health Services Administration, and Doctor of Public Health (see www.gwumc.edu/sphhs). In the School of Medicine and Health Sciences—the Doctor of Medicine (see www.gwumc.edu), as well as the Master of Science in Health Sciences, Master of Science in Nursing, Doctor of Nursing Practice, and Doctor of Physical Therapy (see www.gwumc.edu/healthsci).

Virginia Campus

With an emphasis on graduate education and research, The George Washington University offers a robust cluster of distinctive research centers and academic programs on its Virginia Campus. The School of Engineering and Applied Science, School of Business, and Graduate School of Education and Human Development offer programs of study leading to graduate degrees at this site. The Virginia Campus offers extensive library and research facilities networked to information databases nationwide.

Through the School of Business and the Graduate School of Education and Human Development, the Executive Master of Science in Information Systems Technology and the Executive Leadership in Human and Organizational Learning, respectively, are offered on the Virginia Campus. The School of Engineering and Applied Science offers course work leading to master's and doctoral degrees in several fields, including an accelerated weekend program leading to the Master of Science in the field of telecommunications and computers.

Through its Advisory Board, the Virginia Campus forges partnerships with industry and government that produce cutting-edge research and educational programs to build strong leaders

and companies, create new knowledge and ideas, and spark innovation and inventive solutions.

Additional information is available at www.gwvirginia.gwu.edu.

Research Centers and Institutes

The University seeks to ensure the close integration of research and teaching, including the employment of students in sponsored projects and the use of research facilities for instructional purposes. See University Regulations for policies governing patent and copyright and the use of human subjects.

Aviation Institute (*V. Motevalli*)

Biostatistics Center (*S. Fowler*)

Cancer Institute (*S. Patierno*)

Center for the Advanced Study of Human Paleobiology (*B. Wood*)

Center on Aging, Health, and Humanities (*G. Cohen*)

Center for Biomimetics and Bioinspired Engineering (*R. Mittal*)

Center for Curriculum, Standards, and Technology (*M. Futrell*)

Center for Digestive Diseases (*B. Bouscarel*)

Center for Economic Research (*A. Yezer*)

Center for Education and Human Service in Acquired Brain Injury (*J. Ruoff*)

Center for Educational Leadership and Transformation (*S. McDade*)

Center for Entrepreneurial Excellence (*E. Winslow, G. Solomon*)

Center for Equity and Excellence in Education (*C. Rivera*)

Center for Evaluation Effectiveness (*K. Newcomer*)

Center for Excellence in Public Leadership (*J. Robinson*)

Center for Global Engagement (*S. Livingston*)

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Center for Global Health (*J. Sherry*)

Center for Health Care Quality (*B. Siegel*)

Center for Health Services Research and Policy (*S. Rosenbaum*)

Center for Injury Prevention and Control (*M. McKay*)

Center for Innovation in Public Service (*K. Newcomer*)

Center for Innovative Media (*N. Seavey, F. Sesno*)

Center for Integrated Behavioral Health Policy (*E. Gopelrud*)

Center for Intelligent Systems Research (*A. Eskandarian*)

Center for International Science and Technology Policy (*N. Vonortas*)

Center for Latin American Issues (*J. Ferrer, Jr.*)

Center for Nuclear Studies (*W. Briscoe*)

Center for Real Estate and Urban Analysis (*M. Staten*)

Center for Rehabilitation Counseling, Research, and Education (*M. McGuire-Kuletz*)

Center for Risk Science and Public Health (*T. Guidotti—Acting*)

Center for the Study of Combustion and the Environment (*H. Miller*)

Center for the Study of Globalization (*J. Forrer*)

Center for the Study of Language and Education (*J. Gomez*)

Center for the Study of Learning (*M. Kirchoff*)

Center for the Study of Public History and Public Culture (*J. Horton*)

Center for Urban Environmental Research (*D. Rain*)

Center for Washington Area Studies (*G. Young*)

Creative and Innovative Economy Center (*M. Ryan*)

Cyber Security Policy and Research Institute (*C.D. Martin*)

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Dean Dinwoodey Center for Intellectual Property Studies (*M. Adelman, R. Brauneis*)

European Union Research Center (*S. Rehman*)

First Federal Congress Project (*C. Bickford*)

Global and Entrepreneurial Finance Research Institute (*T. Barnhill*)

Hamilton Fish Institute on School and Community Violence (*B.C. Glenn*)

HIV/AIDS Institute (*A. Greenberg/G. Simon*)

James F. Humphreys Center for Complex Litigation and Civil Procedure (*R. Trangsrud*)

Institute for Biomedical Engineering (*J. Hahn*)

Institute for Biomedical Sciences (*L. Werling*)

Institute for Communitarian Policy Studies (*A. Etzioni*)

Institute for Computer Graphics (*J. Hahn*)

Institute for Constitutional Studies (*M. Marcus*)

Institute for Corporate Responsibility (*T. Fort*)

Institute for Crisis, Disaster, and Risk Management (*G. Shaw*)

Institute for Education Studies (*J. Gomez*)

Institute for Ethnographic Research (*R. Grinker*)

Institute for European, Russian, and Eurasian Studies (*H. Harrison*)

Institute for Global and International Studies (*D. Avant*)

Institute for Integrating Statistics in Decision Sciences (*R. Soyer*)

Institute for International Economic Policy (*M. Moore*)

Institute for Knowledge and Innovation (*M. Stankosky, W. Halal*)

Institute for Magnetism Research (*E. Della Torre*)

Institute for Massively Parallel Applications and Computing Technologies (*R. El-Ghazawi*)

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Institute for Materials Science (*D. Ramaker, C. Gilmore*)

Institute for MEMS and VLSI Technologies (*M. Zaghoul*)

Institute for Middle East Studies (*N. Brown*)

Institute for Politics, Democracy, and the Internet (*J. Germany*)

Institute for Public Policy (*H. Wolman*)

Institute for Reliability and Risk Analysis (*N. Singpurwalla*)

Institute for Security and Conflict Studies (*M. Brown*)

International Institute of Tourism Studies (*K. Lamoureux*) (*M. Zea*)

International Rule of Law Center (*S. Karamanian*)

Institute for Spirituality and Health (*C. Puchalski*)

Institute for Translational Research and Development (*P. Hotez*)

W.M. Keck Institute for Proteomics Technology and Applications (*A. Vertes, F. Kashanchi*)

Latino Health Research Center

Lipid Research Clinic (*J. Hsia*)

National Crash Analysis Center (*C.D. Kan*)

National Health Policy Forum (*J. Jones*)

Prevention Research Center (*A. El-Mohandes*)

Ronald Reagan Institute of Emergency Medicine (*R. Shesser, J. Smith*)

Eleanor Roosevelt and Human Rights Project (*A. Black*)

Sigur Center for Asian Studies (*D. Ollapally*)

Space Policy Institute (*S. Pace*)

Transportation Research Institute (*vacant*)

Wertlieb Educational Institute for Long-Term Care Management (*R. Burke*)

Women's Leadership Institute (*E. Davis*)

Welling Professors

The George Washington University has a category of distinguished “occasional” professorships known as the Welling Professors. The professorships are named for James Clark Welling, who was president of GW for most of the last quarter of the 19th century, during which time this institution assumed many of the attributes of a modern research university. The intent of the Welling Professorships, established in 1995, is to bring internationally distinguished scholars to GW on an occasional basis and engage them in the intellectual life of students and faculty through public lectures, small group discussions, and other forums.

Office of University Students

The Office of University Students makes main-campus, credit-bearing courses available to those who are not currently degree candidates at this University. Such students, often employed in government or industry, may be taking courses to enhance their career potential or as a matter of personal interest. They may be candidates for higher degrees at other institutions, sent here for special work as part of a graduate program. They may be undergraduates matriculated elsewhere, taking courses for transfer to their own institution or preparing for graduate work.

The Office of University Students allows a maximum of 12 credits at the graduate level and 18 at the undergraduate level, except in special circumstances as approved by the director. Medical and law courses are not available to nondegree students.

Entrance Requirements—The Office of University Students requires visiting, nondegree applicants to have appropriate academic preparation prior to enrollment. Prerequisites are specified in the departmental course descriptions in this Bulletin. Contact the specific department for further information regarding appropriate academic background for a particular course. In

addition, the applicant who has previously attended this or another college or university must be in good standing at that institution. An applicant who has been suspended from any educational institution for poor scholarship will not be considered for admission for one calendar year after the effective date of the suspension. An applicant who has been denied admission within this University will not be considered for admission as a nondegree student for the same semester for which the application was denied. Online applications for admission through the Office of University Students are necessary for all nondegree students. For information on registration, please refer to the Schedule of Classes or visit www.gwu.edu/~ous.

Tuition and Fees—For information regarding fall and spring semester tuition and fees, see Fees and Financial Regulations in this Bulletin. For information on summer tuition and fees, see www.gwu.edu/summer or contact 202-994-6360 or gwsummer@gwu.edu.

Regulations—Prospective and registered students are urged to acquaint themselves with the regulations concerning attendance and withdrawal under University Regulations in this Bulletin or at the OUS website at www.gwu.edu/~ous.

The deadline for adding a course during the regular fall and spring semester is the end of the second week of classes. A course dropped during the first four weeks of classes will not appear on a student's transcript. A course dropped after the fourth week but before the end of the eighth week will be assigned the grade of *W* (Authorized Withdrawal). The deadline for dropping a course without academic penalty is the end of the eighth week of classes. The deadline for complete withdrawal from a student's entire program of courses without academic penalty is the end of the ninth week of classes.

If the symbol *I* (Incomplete) is assigned, the instructor normally sets a period (maximum of one year) within which the uncompleted work must be made up. An Incomplete that is not changed within one calendar year becomes a grade of *IF* on the student's record.

All adjustments to course schedules during a regular summer session must be made within the first seven days of the official start of classes.

Summer Sessions

Courses are offered during the summer by all degree-granting divisions of the University.

Summer Sessions also offers special programs that are not available during the regular academic year. Courses are offered during both day and evening hours. Students who are enrolled at the University for the spring semester may register for the following Summer Sessions without special application. Those who wish degree status may seek admission from the appropriate school within the University. Those who do not wish to work toward a degree at the University may apply through the process described in the Summer Sessions Announcement. For a complete statement concerning summer term work, see the Summer Sessions Announcement at www.gwu.edu/summer or contact 202-994-6360 or gwsummer@gwu.edu.

Consortium of Universities of the Washington Metropolitan Area

The George Washington University is a member of the Consortium of Universities of the Washington Metropolitan Area. Twelve universities in the Washington area—American University, Catholic University of America, Gallaudet University, George Mason University, George Washington University, Georgetown University, Howard University, Marymount University, Southeastern University, Trinity University, the University of the District of Columbia, and the University of Maryland—are associated in a Consortium through which they coordinate the use of their respective facilities. Students in approved programs leading to degrees

in any one of these institutions have the opportunity to select from the combined offerings the particular courses that best meet their needs. This privilege is subject to regulations of the school in which the student is enrolled. Participation is limited to degree candidates. Law and medical students are excluded from participation, except for LL.M. candidates. See the Schedule of Classes for specific regulations and information concerning registration for Consortium courses.

Registration forms and instructions are available from the registrar of the institution in which the student is enrolled. Students register and pay tuition at their own institutions for all Consortium courses; course fees are payable to the visited institutions.

The University Libraries

The library collections of over two million volumes are housed in Melvin Gelman Library (the general library of the University), Jacob Burns Law Library, Paul Himmelfarb Health Sciences Library, the Virginia Campus Library, and Eckles Memorial Library on the Mount Vernon campus. The George Washington University is a member of the Association of Research Libraries, whose mission “influences the changing environment of scholarly communication and the public policies that affect research libraries and the communities they serve.”

The libraries strive to fulfill the curricular and research needs of the University’s students. University appropriations supplemented by endowments and gifts provide electronic and paper research materials in the social sciences, the humanities, the sciences, engineering, education, business, law, medicine, and public health. Gifts from many sources have enriched the collections.

Information about using the libraries is available on the libraries’ websites and at library service desks. Individual and class instruction in the use of the libraries and orientation to library facilities are given by librarians upon request as well as through print, media, and computer-

assisted instruction. Through use of the many journal article databases and online resources, students identify and locate desired research materials not easily found through more traditional methods. The libraries' staff assist members of the University in using the rich resources of the Washington area and the unusual opportunities they offer for extensive research.

Students, faculty, and staff at George Washington University (except students in the Law School and Medical Center) may borrow directly and remotely, using the consortium loan service, from the libraries of the seven other academic institutions in the Washington Research Library Consortium (WRLC). Members of the GW community may also obtain resources from other libraries in the area and throughout the United States using other library consortial arrangements and interlibrary loan.

The libraries provide a WRLC combined online catalog representing nearly 3.8 million titles and over 7.4 million volumes. ALADIN, the online research portal for the libraries, offers access to over 200 databases and can be accessed via the Internet from numerous computers in the libraries, residence halls, and University offices, as well as remotely from off campus.

The Writing Center

The Writing Center provides writing assistance to GW students for all courses, both undergraduate and graduate, in all schools of the University and at all levels of experience and expertise. Students receive assistance in identifying writing problems and learning how best to express ideas. Trained tutors (undergraduate peer tutors, graduate students, and the director and other members of the faculty) work with students individually on areas of specific need or interest. Tutors provide assistance in such areas as organizing a mass of information efficiently and clearly, using correct grammar and punctuation, getting started on a writing project,

developing a thesis, providing evidence in support of an argument, and presenting the findings of an experiment or the solution to a research problem.

Prizes

The following academic prizes are supported by permanently endowed funds established through the Office of the Vice President and Treasurer. The many other prizes and awards available to GW students are funded annually, rather than by permanent endowment, and are listed in the annual commencement program when information is provided in time for publication.

Elizabeth B. Adams Prize—Awarded annually by the Department of Information Systems and Technology Management to a graduating student for outstanding performance in the field of information systems management. The recipient is selected on the basis of scholarship, leadership within the Department, contributions to the University, and service to the community.

Sylvia L. Bunting Prize—Awarded annually to a graduate student in the field of biology or zoology.

John Henry Cowles Prizes—Two prizes, established by John H. Cowles, Grand Commander of the Supreme Council of Thirty-third Degree (Mother Council of the World) of the Ancient and Accepted Scottish Rite of Freemasonry, Southern Jurisdiction of the United States of America. Awarded upon graduation to the graduate or undergraduate student with the best overall scholastic achievement and leadership potential in the School of Business and in the Elliott School of International Affairs.

Ching-Yao Hsieh Prize—Two prizes awarded annually, one to an undergraduate and one to a graduate student in the Department of Economics.

Cecille R. Hunt Prize—Offered annually to deserving art students.

Elmer Louis Kayser Prize—Established by Paul and Elizabeth Rutheiser to be awarded annually by the Department of History for the best thesis in history submitted by a candidate for the degree of Master of Arts.

Minna Mirin Kullback Memorial Prize—Established in 1968 by Solomon Kullback in memory of his wife. Awarded annually by a committee of faculty members of the Department of Statistics to a full-time undergraduate or graduate student majoring in statistics, who will have completed 18 credit hours of statistics courses by the end of the spring semester.

Laurence Leite Prize—Awarded annually to a second-year M.A. candidate in art history.

Martin Mahler Prize in Materials Testing—Awarded to the upper-division or graduate student in engineering who submits the best reports on tests in the materials laboratory course, with preference given to prestressed concrete tests.

Nicole M. Paul Prize—Awarded annually to a first-year master's degree candidate in the Women's Studies Program.

Howard C. Sacks Prize—Awarded to a student in political science who has demonstrated outstanding academic achievement in the study of Far Eastern affairs.

Julian H. Singman Prizes—Two prizes awarded annually, one in design and one in aquarelle painting.

Alfred E. Steck Memorial Prize—Awarded for proven excellence in the field of sculpture.

Charles Clinton Swisher Historical Club Prize—Established in 1936 by the Charles Clinton Swisher Historical Club and augmented in 1941 by the bequest of Professor Swisher. Awarded annually to the student who submits the best essay covering some phase of medieval history.

James H. Taylor Graduate Mathematics Prize—Established in memory of James H. Taylor, former Professor of Mathematics at the University. Awarded annually to a graduate student for outstanding performance in mathematics.

Patricia M. Toel Memorial Prize—Awarded annually to a graduate student in photography to recognize outstanding achievement.

Benjamin D. Van Evera Memorial Prize—Awarded annually to that Graduate Teaching Fellow in Chemistry selected as the most effective teacher during the current academic year.

Thomas F. Walsh Prize—Established in 1901 and awarded annually to the student who submits the best essay in Irish history.

Alexander Wilbourne Weddell Prize—Established in 1923 by Virginia Chase Weddell in memory of her husband. Awarded annually to a degree candidate who writes the best essay on “the promotion of peace among the nations of the world.” The prize essays shall become the property of the University and shall not be printed or published without the written consent of the University. The University reserves the right to withhold the award if no essay attaining the required degree of excellence is submitted.

W.T. Woodson Prize—Awarded annually to a graduate student demonstrating outstanding achievement in educational administration in the Graduate School of Education and Human Development.

GW Alumni Association

The objectives of this organization are to unite the graduates who wish to associate themselves for charitable, educational, literary, and scientific purposes, and to promote the general welfare of the University.

Membership in the Association is conveyed automatically to anyone who has been graduated from any school or division of the University. Anyone who has earned 15 credit hours or the equivalent at the University, who has left the University in good standing, and whose class has graduated is eligible for membership; in the case of the Office of University Students, however, only the “15 credit hours earned” requirement and not the “graduation of the class” requirement applies. Graduates of Center for Professional Development certificate programs are also eligible.

A Governing Board, composed of members representing the constituent alumni organizations, directs the activities of the Association. The voluntary leadership of the Association works closely with the staff of the Office of Alumni Relations in carrying out Association affairs. The Association may be contacted through the Office of Alumni Relations.

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UNIVERSITY REGULATIONS

Students enrolled in the University are required to conform to the following regulations and to comply with the requirements and regulations of the school in which they are registered.

Students who withdraw or are suspended, or who, for any other reason, are not registered at the University for one semester or more, may reapply and, if readmitted, continue their program only under the regulations and requirements in force at the time of return.

If a student knowingly makes a false statement or conceals material information on an application for admission or any other University document, the student’s registration may be canceled. If such falsification is discovered after the student has matriculated at the University, the student may be subject to dismissal from the University. Such a student will be ineligible (except by special action of the faculty) for subsequent registration in the University.

Registration

Information on registration procedures is stated on the Registrar's Office website and in the Schedule of Classes, which is available in advance of each semester.

Registration in courses is open only to those persons formally admitted to the University by the appropriate admitting office and to continuing students in good standing.

Students may not register concurrently in this University and another institution without the prior permission of the dean of the school in which they are registered in this University. With the exception of students enrolled in a joint degree program, registration in more than one school of the University requires the written permission of the deans concerned, prior to registration. Registration is not complete until all financial obligations have been met. Individuals without a valid registration may not attend class or earn any course credit.

Eligibility for Registration—Registration for the following categories of on-campus students is held on the days of registration indicated in the Schedule of Classes. A student who is suspended or whose record is encumbered for any reason is not eligible to register. Registration in a given course may be denied to nondegree students by the Office of University Students when space is needed for degree candidates.

New Student—Upon receipt of a letter of admission and payment of any required deposit, the new student is eligible for registration on the stated days of registration.

Readmitted Student—A student previously registered in the University who was not registered during the preceding semester must apply for and be granted readmission by the appropriate admitting office before being eligible for registration.

Continuing Student—A student registered on campus in the immediately preceding semester or the summer session preceding the fall semester is eligible to register assuming good standing and enrollment in a continuing program.

Completion of Registration—Registration is not complete until financial obligations have been fulfilled. Students who do not complete their financial obligations in a timely manner may have their registration canceled and will not be permitted to attend class.

Registration for Consortium Courses—Degree students interested in taking courses at any of the other institutions in the Consortium of Universities of the Washington Metropolitan Area, Inc., should consult the program announcements of the other institutions. Consortium registration forms and instructions may be picked up in the Office of the Registrar. In order to participate in the Consortium program, students must obtain the approval of an advisor and should ascertain from the department of the institution where the course is taught whether they are eligible for the course and whether there is space in the class. Specific inquiries should be addressed to the Registrar's Office. Detailed information concerning Consortium policy and procedures is printed in the Schedule of Classes and is available on the Registrar's Office website.

Adding and Dropping Courses

During the registration period (before the end of the second week of classes) students may add or drop courses using GWeb. After the second week of classes, students who wish to add or drop a course must complete a Registration Transaction Form and submit the form to the office of their dean; forms are available on line, at deans' offices, and in the Office of the Registrar. Adding a course after the second week requires a signature of the instructor or other authorized member of the department.

A course dropped during the first four weeks of classes will not appear on the student's transcript. A course dropped after the fourth week but before the end of the eighth week will be assigned a notation of *W* (Authorized Withdrawal).

The deadline for dropping a course without academic penalty is the end of the eighth week of classes in the fall and spring semesters. After the end of the eighth week of classes, dropping a course without academic penalty is only possible after the student presents a petition to the dean and receives written permission.

All charges for courses from which the student withdraws are subject to the refund policy listed under Fees and Financial Regulations in this Bulletin. Failure to withdraw by these procedures can result in an extended financial obligation and the recording of a grade of *F* (Failure) or a notation of *Z* (Unauthorized Withdrawal).

Changes in Program of Study

Changes Within a School—A student may not substitute one course for another within an established program of study or change status from credit to audit or from audit to credit without the approval of the dean of the school in which he or she is registered. Change from one major field to another within the same school may be made with the approval of the dean.

Transfer Within the University—Application for transfer to another school must be made to the appropriate admitting office on the form provided by the office concerned.

Grades

Grades are made available to students through the Office of the Registrar after the close of each semester. The following grading system is used: *A*, Excellent; *B*, Good; *C*, Minimum Pass; *F*, Fail; other grades that may be assigned are *A–*, *B+*, *B–*, *C+*, and *C–*. Symbols that may appear include *CR*, Credit; *NC*, No Credit; *AU*, Audit; *I*, Incomplete; *IPG*, In Progress; *W*, Authorized Withdrawal; *Z*, Unauthorized Withdrawal.

Except for courses that specifically state that repetition for credit is permitted, a candidate for a degree at this University may not repeat a course in which a grade of *C–* or better was received,

unless required to do so by the department concerned. A written statement to this effect must be submitted to the student's dean by the appropriate department chair.

The symbol of *Z* is assigned when students are registered for a course that they have not attended or have attended only briefly, and in which they have done no graded work. At the end of the academic year, students' records are reviewed; if there is more than one *Z* per semester, a student's record will be encumbered until released by the student's advisor or academic dean. The symbol of *Z* is not a grade but an administrative notation.

Incompletes—The symbol *I* (Incomplete) indicates that a satisfactory explanation has been given the instructor for the student's inability to complete the required course work during the semester of enrollment. At the option of the instructor, the symbol *I* may be recorded if a student, for reasons beyond the student's control, is unable to complete the work of the course, and if the instructor is informed of, and approves, such reasons before the date when grades must be reported. This symbol may be used only if the student's prior performance and class attendance in the course have been satisfactory. Any failure to complete the work of a course that is not satisfactorily explained to the instructor before the date when grades must be turned in will be graded *F*, Failure. If acceptable reasons are later presented to the instructor, that instructor may initiate an appropriate grade change, which in all cases will include the symbol *I*. The course work must be completed within the designated time period agreed upon by the instructor and student, but (except in the School of Business) no more than one calendar year from the end of the semester in which the course was taken. In the School of Business, the symbol *I* must be changed by a date agreed on by the instructor and the student, but no later than the last day of the examination period for the fall or spring semester immediately following the semester or summer session in which the symbol *I* is assigned. When work for the course is completed, the instructor

will complete a grade change form and turn it in to the Office of the Registrar. The grade earned will be indicated in the form of *I*, followed by the grade. The indication of *I* cannot be removed and remains on the student's permanent academic record even after the course has been successfully completed. If work for the course is not completed within the designated time, the grade will be automatically converted to a grade of *IF*, Incomplete/Failure, 0 quality points, and the grade-point average and academic standing recalculated.

The Grade-Point Average—Scholarship is computed in terms of the grade-point average, obtained by dividing the number of quality points by the number of credit hours for which the student has registered, both based on his or her record in this University. The grade-point average is computed as follows: *A*, 4.0; *A–*, 3.7; *B+*, 3.3; *B*, 3.0; *B–*, 2.7; *C+*, 2.3; *C*, 2.0; *C–*, 1.7; *F*, 0, for each credit hour for which the student has registered as a degree-seeking student.

Although credit value for a course in which a grade of *F* is earned appears on the transcript for the purpose of calculating the grade-point average, no academic credit is awarded. In the case of a student who is allowed to repeat a course, the first grade received remains on the student's record and is included in the grade-point average. Courses marked *AU*, *CR*, *I*, *IPG*, *W*, or *Z* are not considered in determining the average, except that courses marked *I* will be considered when a final grade is recorded. With the exception of Consortium courses, grades in courses taken at other institutions are not considered in computing the grade-point average.

Graduation Requirements

Degrees are conferred in January, May, and August. To be recommended by the faculty for graduation a student must have met the admission requirements of the school in which registered; completed satisfactorily the scholarship, curriculum, residence, and other requirements for the degree as stated in this bulletin; filed an application for graduation by the

published deadline date; and be free from all indebtedness to the University. Enrollment is required for the semester or summer at the close of which the degree is to be conferred, and all degree requirements must be completed by the last day of final examinations for that semester or summer session.

Participation in the Commencement Ceremony—Participation in the annual commencement ceremony held in May is open to students who have applied to graduate in the current spring semester or who graduated the preceding fall semester or summer session. With the exception of doctoral candidates, all students, graduate or undergraduate, who need no more than 9 credit hours to complete their degree requirements, may participate in May commencement ceremonies if there is a reasonable expectation that they will be able to obtain the needed credits during the following summer. The maximum of 9 credit hours is firm and not subject to petition.

Students whose program includes a thesis or dissertation must meet the following Electronic Theses and Dissertations (ETD) deadlines for graduation in the respective semesters: for theses, May 15 for spring, January 15 for fall, and August 15 for summer; for dissertations, April 1 for spring, January 15 for fall, and August 15 for summer.

Doctoral candidates who have not successfully defended their dissertation and met the ETD deadline may not participate in either the May commencement or hooding ceremony.

Students who apply after the published deadlines are not guaranteed commencement materials and may not be listed in the commencement program. Summer graduates who elect to attend the preceding May ceremony must apply for graduation no later than February 1.

Scholarship and Residence—Students must meet the scholarship and residence requirements for the degree for which they are registered.

Curriculum—Minimum curriculum requirements for each degree are stated under the school offering work in preparation for the degree. In cases where specific curricular information is not provided in this Bulletin, the program of study, as indicated by the program faculty, must be completed.

Thesis or Dissertation—A thesis or dissertation submitted in partial fulfillment of requirements for a degree must be presented in its final form by the deadline set by the school concerned. Accepted theses and dissertations, with accompanying files, become the property of the University. Accepted theses and dissertations are submitted electronically; the student pays a processing fee directly to Proquest/UMI. See the appropriate school in this Bulletin for regulations governing theses and dissertations.

Continuous Enrollment Status

Once entered in a degree program, a student is expected to be continuously enrolled and actively engaged in fulfilling the requirements for the degree each semester of the academic year until such time as the degree is conferred. A student is considered to be continuously enrolled when registered for courses or when engaged in and appropriately registered for activities such as the following, with the prior approval of the school in which the student is enrolled: cooperative work semester; study abroad program; attendance at another institution with prior approval to have work transferred back to the GW program; completion of outstanding work in courses in which a grade of Incomplete or In Progress was received (at the undergraduate level); or non-course instructional activities unique to the particular school. This status is generally limited to one year. Should the student break continuous enrollment at the University and not request and

be granted a leave of absence (see below), he or she must apply for readmission and, if granted, be subject to the requirements and regulations then in force.

Leave of Absence

Should a degree student find it necessary to interrupt active pursuit of the degree, he or she may petition the dean for a leave of absence for a specific period of time, generally limited to one calendar year. A degree student who discontinues active enrollment in degree studies without being granted a leave of absence, or a student granted a leave who does not return to active study at the close of the period of approved absence, must apply for readmission and be subject to the regulations and requirements then in force. The right to use of University facilities is suspended while the leave is in effect.

Policy Regarding Students Called to Active Military Duty

Any student who is a member of a military reserve unit or the National Guard and is activated or called to active duty early in a semester or summer session automatically will be entitled to a full refund of all tuition and fees that he or she has paid toward the expenses of that academic term. If the notification of the call to active duty comes after the mid-term examinations or after other substantial graded work has been completed, the student will have the option of either taking a full refund of tuition and fees or taking an Incomplete in his or her courses with the privilege of returning to complete all required course work at some future date without payment of any further tuition and fee charges. It is the responsibility of the student to present evidence of his or her activation to the Office of Student Accounts and to request the appropriate refund.

Should a degree student called up for active duty find it necessary to interrupt active pursuit of the degree, he or she may petition the dean for a leave of absence for a specified period of time, generally limited to one calendar year. Deans are encouraged to grant any request to extend the leave of absence for longer than the customary period should military service require an absence of more than one year.

All students on active duty will be automatically exempted from the request for a \$50 voluntary library contribution without requiring any communication from them or their initials on the bill.

Complete Withdrawal From the University

A degree-seeking student who wishes to withdraw from all courses during a given semester must complete a Complete Withdrawal Form and submit it to the Office of the Registrar. Forms are available on line, at deans' offices, and in the Office of the Registrar. The deadline for complete withdrawal from all courses without academic penalty is the end of the ninth week of classes. Complete withdrawal after the ninth week requires a petition to the dean.

All charges for courses from which the student withdraws are subject to the refund policy listed under Fees and Financial Regulations in this Bulletin. Failure to complete a Complete Withdrawal Form can result in an extended financial obligation and the recording of grades of *F* (Failure) or notations of *Z* (Unauthorized Withdrawal).

University Policies and Definitions

University Policy on Equal Opportunity—The George Washington University does not unlawfully discriminate against any person on the basis of race, color, religion, sex, national origin, age, disability, veteran status, or sexual orientation. This policy covers all programs,

services, policies, and procedures of the University, including admission to educational programs and employment. The University is also subject to the District of Columbia Human Rights Law.

Inquiries concerning the application of this policy and federal laws and regulations regarding discrimination in education or employment programs and activities may be addressed to Susan B. Kaplan, Senior Counsel for Labor Relations and Compliance, The George Washington University, Washington, D.C. 20052, (202)994-4433, or to the Assistant Secretary for Civil Rights of the U.S. Department of Education.

Academic Integrity—The University community, in order to fulfill its purposes, must establish and maintain guidelines of academic behavior. All members of the community are expected to exhibit honesty and competence in their academic work. Incoming students have a special responsibility to acquaint themselves with, and make use of, all proper procedures for doing research, writing papers, and taking examinations. Members of the community will be presumed to be familiar with the proper academic procedures and held responsible for applying them. Deliberate failure to act in accordance with such procedures will be considered academic dishonesty. Acts of academic dishonesty are a legal, moral, and intellectual offense against the community and will be prosecuted through the proper University channels. Copies of the University Code of Academic Integrity can be obtained from all department chairs, all academic deans, the Registrar, and the Vice President for Academic Affairs.

Patent and Copyright Policies—Students who produce creative works or make scientific discoveries while employed or supported by the University or through substantial use of University resources are subject to the University's patent and copyright policies (see <http://www.gwu.edu/~research/policies.htm> under Intellectual Property).

Human Research Requirements—Students who are planning to conduct research involving the use of human subjects (for a thesis, dissertation, journal article, poster session, etc.) must obtain Institutional Review Board (IRB) approval before collecting any data. In order to receive this approval, contact the Office of Human Research (Ross Hall, Suite 712, 202-994-2715, or see www.gwumc.edu/research/human.htm) to submit the study for the approval process.

The Library—All students registered in the University have the privilege of using the University's Gelman Library. Its stacks are open, and all students are welcome to browse. Authorized GW identification is needed to enter the library and to borrow books. Any book that circulates is subject to recall by the library if needed for reserve or requested by another user after a minimum of 20 days. Reserve books must be used in the library, except that they may be withdrawn for overnight use two hours before closing time. Transcripts of grades are withheld until a student's library record is clear, with all borrowed books returned and any fines paid. All students using the University's Gelman Library are expected to be familiar with its detailed regulations, available at any of the library's service desks.

Use of Correct English—A report regarding any student whose written or spoken English in any course is unsatisfactory may be sent by the instructor to the dean of the school, who may assign supplementary work, without academic credit, varying with the needs of the student. If the work prescribed is equivalent to a course, the regular tuition fee is charged. The granting of a degree may be delayed for failure to make up any such deficiency in English to the satisfaction of the dean.

Name of Record—A student's name of record includes the first name, middle initial or full middle name, and the family name. Nicknames may not be used. The University will change the name of a currently enrolled student on its official records but will require satisfactory evidence

of a legal basis for the change. The diploma is awarded under the official name of record at the time of graduation.

Student Status—For the purpose of defining student status, during the fall and spring semesters graduate students taking 9 or more credits are considered to be full time, those taking 5 to 8 credits are considered to be half time, and all others are considered to be part time. In the summer full-time status requires 6 credits, half-time status, 3 credits.

Graduate students who have completed all course and credit requirements for the degree except dissertation or thesis research may be certified as full-time students provided they are registered for at least 3 credits of dissertation or thesis research, are actively engaged in dissertation or thesis research and writing, and are not employed more than 20 hours per week. Graduate students who have completed all credit requirements for the degree, including dissertation or thesis research, but have not completed all degree requirements, may be certified as full-time students provided they have not exceeded the established time limits for degree completion, are registered for Continuous Research, and are not employed more than 20 hours per week. Those who meet all conditions stated above but are employed more than 20 hours per week may be certified as half-time students.

Attendance—Students may attend only those classes for which they are officially registered. Regular attendance is expected. Students may be dropped from any course for undue absence. A student suspended for any cause may not attend classes during the period of suspension. Students are held responsible for all of the work of the courses in which they are registered, and all absences must be excused by the instructor before provision is made to make up the work missed.

Credit—Credit is given only after completion of registration in a course and satisfactory completion of the required work, or upon the assignment of advanced standing in accordance with the regulations of the school concerned. Credit that has been applied to the completion of a degree may not subsequently be applied to another degree.

Auditing—A person who has been admitted to the University may be registered, with the permission of the instructor, as an auditor in a class (no academic credit). An auditor is not required to take active part or to pass examinations. A student who takes a course as an auditor may not repeat it later for credit. Tuition is charged at the prevailing rate. A student may not change from audit status to credit status or vice versa after the end of the eighth week of classes.

Post-Admission Transfer Credit—Students who plan to attend another institution and apply credit so earned toward graduation from this University must first secure the written approval of their dean. In no event will credit in excess of what might be earned in a similar period in this University be recognized.

Transcripts of Record—Official transcripts of student records are issued upon written request of the student or former student who has paid all charges, including any student loan installments, due the University at the time of the request. A nominal fee is charged for each official transcript. Unofficial copies of transcripts are available to students, by written request, at a nominal fee. Partial transcripts are not issued. Students have access to their unofficial student record through the GWeb Information System.

Student Conduct—All students, upon enrolling and while attending The George Washington University, are subject to the provisions of the *Guide to Student Rights and Responsibilities*, which outlines student freedoms and responsibilities of conduct, including the Code of Student Conduct, and other policies and regulations as adopted and promulgated by

appropriate University authorities. Copies of these documents may be obtained from the Office of the Dean of Students or from the offices of the academic deans. Sanctions for violation of these regulations may include permanent expulsion from the University. Regulations or requirements applicable only to a particular program, facility, or class of students may not be published generally, but such regulations or requirements shall be published in a manner reasonably calculated to inform affected students.

Right to Dismiss Students—The right is reserved by the University to dismiss or exclude any student from the University, or from any class or classes, whenever, in the interest of the student or the University, the University Administration deems it advisable.

Right to Change Rules and Programs—The University reserves the right to modify or change requirements, rules, and fees. Such regulations shall go into force whenever the proper authorities may determine. The right is reserved by the University to make changes in programs without notice whenever circumstances warrant such changes.

University Policy on the Release of Student Information—The Family Educational Rights and Privacy Act (FERPA) applies to institutional policies governing access to and release of student education records.

The University may release the following directory information upon request: name, local address including e-mail, and telephone number; name and address of emergency contact; dates of attendance; school of enrollment; field of study; enrollment status; credit hours earned; degrees earned; honors received; participation in University-recognized organizations and activities (including intercollegiate athletics); and height, weight, and age of members of athletic teams, as well as likenesses used in University publications. A student who does not wish such directory information released must file written notice to this effect in the Office of the Registrar.

The University's full policy statement on the release of student information is published in the *Guide to Student Rights and Responsibilities*, available in the Office of the Dean of Students or the offices of the academic deans. The full statement also appears on the Registrar's Office website.

Student Identification Number/Social Security Number—The George Washington University has converted from use of the Social Security Number (SSN) to identify records pertaining to individual students, although the SSN is still needed to identify the student for purposes of financial aid eligibility and disbursement and repayment of financial aid and other debts payable to the University. The SSN is required when applying for financial aid. The Internal Revenue Service requires the University to file information that includes a student's SSN and other information such as the amount paid for qualified tuition, related expenses, and interest on educational loans. This information is used to help determine whether a student, or a person claiming a student as a dependent, may take credit or deduction to reduce federal and/or state income taxes. Many efforts are made to protect the privacy of this number, and a student may request an alternate personal identifier. Further information may be obtained by contacting the Office of the Registrar.

Property Responsibility—The University is not responsible for the loss of personal property. A Lost and Found Office is maintained on campus in the University Police Department.

The Schools

COLUMBIAN COLLEGE OF ARTS AND SCIENCES

Dean P. Barratt

Executive Associate Dean R.J. Guenther

Associate Deans P.B. Duff, R.K. Packer, G.M. Schulz, T.G. Wallace

Assistant Deans K.Z. Keller, D. Cronin

The George Washington University awarded its first Doctor of Philosophy degree in 1888, one of the first institutions in the United States to do so. In 1892, the School of Graduate Studies was instituted. A number of organizational entities followed and, in 1965, after several decades of growth, the Graduate School of Arts and Sciences was established. All undergraduate and graduate education and research programs in the arts and sciences were combined in 1992 under one administration with the formation of the Columbian College and Graduate School of Arts and Sciences, now simply called Columbian College of Arts and Sciences.

All graduate programs in the arts and sciences, leading to the degrees of Master of Arts, Master of Fine Arts, Master of Forensic Sciences, Master of Public Administration, Master of Public Policy, Master of Science, Master of Philosophy, Doctor of Psychology, and Doctor of Philosophy, are administered by Columbian College. The faculty of Columbian College sets requirements for admission, provides courses and programs of advanced study and research, and establishes academic standards for its degrees.

Admission Requirements

A detailed description of the policies that follow is available at www.gwu.edu/~ccas. Applicants must hold an undergraduate degree from an accredited institution of higher learning. Applicants should have a strong academic background, usually with a major, or equivalent, in the field in

which they intend to study for an advanced degree. Normally, a *B* average (or equivalent) from an accredited college is required. With evidence of special promise, such as high Graduate Record Examination scores, an applicant whose academic record falls short of a *B* average may be accepted on a conditional basis. Meeting the minimum requirements does not assure acceptance. The departments may, and often do, set higher admission standards. Students who apply in their senior year must provide evidence of the completion of their baccalaureate work before registration is permitted. Graduate courses taken prior to admission while in nondegree status are not used in assessing admissibility to degree programs and may not be transferable into those programs.

With the exception of those applying to certificate programs and M.F.A. degree programs and those holding an earned J.D., M.D., or Ph.D., all applicants are required to submit scores on the GRE general test. In addition, some programs require scores on a GRE subject test (see the Columbian College section of the Graduate Admissions Application). The applicant must have the Educational Testing Service send the required score reports directly to Columbian College of Arts and Sciences. GRE scores are valid for five years.

The following additional requirements pertain to all applicants from countries in which English is not the official language:

1. Applicants who do not hold a degree from a regionally accredited U.S. institution of higher learning are required to submit scores from the Test of English as a Foreign Language (TOEFL) or the academic International English Language Testing System (IELTS). The required minimum score is 550 (paper-based) or 213 (computer-based) or 80 (Internet-based) on the TOEFL, or an overall band score of 6.0 on the academic IELTS with no individual band score below 5.0.

2. Applicants for graduate teaching assistantships must have a minimum score of 600 (paper-based) or 250 (computer-based) or 100 (Internet-based) on the TOEFL, or an overall band score of 7.0 on the academic IELTS with no individual band score below 6.0.

3. Applicants admitted as degree candidates will be required to take the English for Academic Purposes Placement Test at The George Washington University before registering. Those who score 600 (paper-based) or 250 (computer-based) or 100 (Internet-based) or more on the TOEFL, or an overall band score of 7.0 on the academic IELTS with no individual band score below 6.0, are exempted. Depending on the applicant's performance on the placement test, EAP course work may be required.

Application for Admission—Full information is available in the Graduate Admissions Application or see www.gwu.edu/~gradinfo.

Readmission—A student who wishes to resume a graduate program that had been interrupted must file an application form and provide supporting documentation to be considered for readmission. Readmission is not guaranteed, and the application is subject to review by the department concerned and the dean. The student may be required to take additional course work and qualifying examinations on the course work completed. Application forms are available at www.gwu.edu/~gradinfo.

CCAS Regulations

CCAS provides an on-line Graduate Student Handbook (see www.gwu.edu/~ccas) that contains additional updated information on policies, regulations, and other matters of concern to enrolled or admitted students. It is the responsibility of the student to be aware of the information contained in both this Bulletin and the Handbook.

Grades

Information on grades and computing the grade-point average is found under University Regulations.

The symbol *I* (Incomplete) indicates that only a small portion of the required course work remains to be completed and that a satisfactory explanation has been given to the instructor for the student's failure to complete the required work for a course. Conditionally admitted students and students on academic probation may not receive a notation of *I*. The conditions of the Incomplete must be detailed in a formal contract (available at www.gwu.edu/~ccas) signed by the student and instructor and submitted to the department prior to recording the *I*. All other policies governing Incompletes are indicated under University Regulations.

The symbol *IPG* (In Progress) is given for all thesis and dissertation research courses until the thesis or dissertation is completed. Upon the satisfactory completion of the thesis or dissertation, the symbol *IPG* is automatically changed to *CR* (Credit). *CR* may be indicated for Advanced Reading and Research courses and independent research courses.

Scholarship Requirements

Graduate students are required to maintain a minimum cumulative grade-point average of 3.0 (*B*) in all course work taken following admission to a graduate program in the College. Individual departments may require a higher average. Only graduate course work that is taken at the University or through the Consortium and forms part of the student's departmentally approved program of studies may be included in the grade-point average. When a grade of *F* is received for a course, the grade is included in the student's grade-point average whether or not the course is repeated.

A student may repeat a course in which a grade of *C* or above was received only when permitted to do so by the department concerned, unless the course description states that the course may be repeated for credit. A written statement of permission must be submitted for approval to the CCAS Graduate Office by the appropriate departmental advisor. If a course is repeated, the first grade received remains on the student's record and is included in the student's grade-point average.

A graduate student may take an advanced undergraduate course (at the 100 level) for graduate credit only upon the approval of the department at the time of registration. Such approval is granted only with the provision that the student complete additional work in order to receive graduate credit. No courses numbered 100 or below may be taken for graduate credit.

Program of Studies

The program of studies is a formal agreement between a student and a department of the requirements to be met in completing a specific degree program as well as the dates by which each requirement must be completed. Students should consult their department graduate advisor to outline their program of studies as soon as they begin graduate work.

Students must make sure that they are fully informed of the requirements of Columbian College of Arts and Sciences as well as the requirements of their department or program. It is especially important for those admitted with conditions to consult with their departmental advisors as early as possible regarding completion of the additional requirements specified in the letter of admission.

Academic Work Load—All degree candidates must be registered for a minimum of 3 credits unless they are eligible for continuing registration. Full-time students register for 9 to 12 credits each fall and spring semester, half-time students for 5 to 8 credits, and part-time students for 3 or

4 credits. In the summer, full-time status requires 6 credits, half-time status, 3 credits. These credit amounts do not apply to students who have fewer than the stated number of credits remaining to complete their programs. No more than 15 credits may be taken during any one semester without permission of the department and the dean. Students who are employed more than 20 hours per week should not register for more than 6 credits in any semester.

Continuing Research

All students must be continuously enrolled while working toward a degree, except during the summer sessions. (A few programs may require summer registration as well.) Students who have completed all course work and thesis or dissertation research requirements and are within CCAS deadlines must register for 1 credit of CCAS 920 or 940, Continuing Research, each semester until completion of the program. If continuous enrollment is not maintained, the student is dropped from the degree program unless the student is registered for a leave of absence by the CCAS Graduate Office.

Leave of Absence

A student who, for personal reasons, is temporarily unable to continue the program of studies may request leave of absence for a specific period of time, not to exceed two semesters during the total period of degree candidacy. If the request is approved by the CCAS Graduate Office, that office will register the student for a leave of absence for each semester.

Graduation Requirements

All students must file an Application for Graduation early in the semester or summer session in which they intend to graduate (see the University Calendar). Students must be registered in active status in the College during the semester or summer session in which they plan to graduate. Degrees are conferred in January, May, and August. Students who have completed the

requirements for a degree but have not yet been awarded the degree will be issued a letter to this effect upon request to the CCAS Graduate Office. A commencement ceremony is held annually in May.

Degrees

Listed below are the graduate degree programs of Columbian College of Arts and Sciences and the specific degrees offered, by field. The programs are directed by the departments concerned.

Degree programs that bridge two or more departments are directed by committees composed of members of the departments concerned. For further information write to the chair of the appropriate department.

Graduate Fields

The graduate course work offered in support of the degree programs in the following list is shown by department in this Bulletin.

Degrees Offered

Humanities

American Studies	M.A.	Ph.D.
Art History	M.A.	
Classical Acting	M.F.A.	
English	M.A.	Ph.D.
Fine Arts	M.F.A.	
Ceramics/Sculpture, Drawing/Painting, New Media, Photography		
Interior Design	M.F.A.	
Museum Studies	M.A.	

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Theatre Design	M.F.A.	
Women's Studies	M.A.	
Social and Behavioral Sciences		
Anthropology	M.A.	
Art Therapy	M.A.	
Counseling		Ph.D.
Criminal Justice	M.A.	
Economics	M.A.	Ph.D.
Geography	M.A.	
History	M.A.	Ph.D.
Media and Public Affairs	M.A.	
Organizational Sciences	M.A.	
Political Science	M.A.	Ph.D.
Professional Psychology		Psy.D.
Psychology		Ph.D.
Public Administration	M.P.A.	
Public Policy	M.P.P.	
Environmental and Resource Policy	M.A.	
Philosophy and Social Policy	M.A.	
Women's Studies	M.A.	
Public Policy and Administration		Ph.D.
Sociology	M.A.	
Speech–Language Pathology	M.A.	

Natural, Mathematical, and Biomedical Sciences

Applied Mathematics	M.S.	
Biochemistry	M.S.	
Biochemistry and Molecular Genetics		Ph.D.
Biological Sciences	M.S.	Ph.D.
Biostatistics	M.S.	Ph.D.
Chemistry	M.S.	Ph.D.
Epidemiology	M.S.	Ph.D.
Forensic Sciences	M.F.S.	
Genomics and Bioinformatics	M.S.	
Hominid Paleobiology	M.S.	Ph.D.
Mathematics	M.A.	Ph.D.
Microbiology and Immunology		Ph.D.
Molecular Medicine		Ph.D.
Physics	M.S.	Ph.D.
Statistics	M.S.	Ph.D.

Requirements for the Degrees

The Master's Programs

Unless otherwise specified, the requirements listed below are applicable to candidates for all master's degrees offered by Columbian College of Arts and Sciences.

1. *General Requirements*—For a master's degree program that includes a thesis, satisfactory completion of a minimum of 30 credit hours of approved graduate work, including 6 credit hours of thesis research, is required. For a master's degree program that does not include a thesis, the

number of credit hours of approved graduate course work is determined by the department and normally consists of from 30 to 36 credit hours. Some departments offer a choice between a thesis option and a non-thesis option. Departments can and often do set requirements above the minimum required by Columbian College. Undergraduate courses taken to make up deficiencies are not counted toward program requirements.

Upon approval, up to one-half of the required graduate work may be taken in courses offered by another degree-granting division of this University. With approval, up to one-quarter of work toward a master's degree may be taken in courses offered by the other affiliated institutions of the Consortium of Universities of the Washington Metropolitan Area. In all cases, at least one-half of the hours counting toward the master's degree must be taken after entering the program, in courses offered by Columbian College of Arts and Sciences.

Master's students have an overall four-year time limit for completion of all degree requirements.

2. *Transfer of Credit*—A maximum of one-quarter of the credit hours of graduate course work required for a degree may be approved for transfer to a graduate program in Columbian College from enrollment in nondegree status at GW or from another degree-granting school of this University or another accredited college or university. For a transfer of credit to be approved, *all* of the following conditions must be met: the course work must be from an accredited institution and must have been taken within the two years prior to matriculation; it must be approved by the department as part of the student's program of studies; it must not have been applied to the completion of requirements for another degree; it must be post-baccalaureate graduate-level course work; and the student must have received a grade of *B* or better in each course for which a transfer of credit is requested. Requests for transfer credit must be submitted

in writing and approved by the departmental advisor and the dean during the student's first year in the program. An official transcript of the course work must be on file before the request can be considered.

Once enrolled in Columbian College of Arts and Sciences, students are not permitted to transfer course work taken outside the University, except under extraordinary circumstances; permission must be sought from the dean in advance.

3. *Special Program Requirements*—Certain programs require their degree candidates to demonstrate a reading knowledge of an appropriate foreign language or languages, a competence in quantitative methods, or some other special subject requirement. Courses taken at the undergraduate level to fulfill these requirements may not be counted in the number of graduate credit hours required for these programs.

4. *Master's Comprehensive Examination*—Most programs require degree candidates to pass a Master's Comprehensive Examination in the major subject. Examinations are held on dates fixed by the departments. The nature and form of the examination are the responsibility of the department or program. A student who fails to pass the Master's Comprehensive Examination may, with the approval of the department, repeat the examination at the next scheduled examination date. If the student fails a second time, no further opportunity to take the examination is permitted, and the student's degree candidacy is terminated.

5. *The Thesis*—The main purposes of a master's thesis are to demonstrate the student's ability to make independent use of information and training and to furnish objective evidence of constructive powers in a chosen field. The student registers for 6 credit hours of thesis research. Registration for thesis research entitles the student to the advice and direction of the member of the faculty under whom the thesis is to be written. The thesis subject must be approved by the

faculty member who will be directing the thesis. All theses must be submitted electronically and meet the formatting and other requirements set forth on line at www.gwu.edu/~etds.

The Doctor of Philosophy Program

The Doctor of Philosophy program is divided into two parts: precandidacy and candidacy.

During precandidacy, a student completes the general requirements and the General Examination. Upon satisfactory completion of the requirements associated with precandidacy, the student is considered by the department or program and the dean for admission to candidacy. During candidacy, the dissertation is prepared and defended in the Final Examination.

The minimum requirements are as follows:

1. *General Requirements*—The programs leading to the degree of Doctor of Philosophy require the satisfactory completion of a minimum of 72 credit hours of approved graduate course work, including at least 12 and at most 24 hours of dissertation research. A minimum of 48 of these hours must be taken in the precandidacy stage, in preparation for the General Examination. A maximum of one-sixth of these hours may be taken in courses offered by the other affiliated members of the Consortium of Washington Area Universities. The exact number of credit hours required for any part of the total program is assigned by each department and may exceed the minimum required by the Columbian College.

Ph.D. students have an overall eight-year time limit for completion of all degree requirements.

2. *Transfer of Credit*—Entering students who hold a master's degree from an accredited institution and in a field relevant to the proposed doctoral field of study may request transfer of up to 24 hours of credit toward a doctoral degree. For those who do not hold the master's degree,

a maximum of 24 hours of credit may be transferred, provided the conditions listed under The Master's Programs (Item 2) above are met.

3. *Special Program Requirements*—Certain programs require their degree candidates to demonstrate a reading knowledge of an appropriate foreign language or languages, a competence in quantitative methods, or some other special subject requirement. Courses taken at the undergraduate level to fulfill special program requirements may not be counted in the number of graduate credit hours required for the student's doctoral program, except that up to 6 hours of course work at the 100 level may be so counted, with the approval of the department. For further information on these and other regulations, consult the Graduate Student Handbook and the departments and programs concerned.

4. *The General Examination*—The General Examination is composed of a written examination in each of the areas of study comprising the student's program. A student who fails to pass any part of the General Examination may, with the approval of the department, repeat the examination at the next scheduled examination date. If the student fails a second time, no further opportunity to take the examination is permitted, and the student's degree candidacy is terminated.

Satisfactory performance on the General Examination is required for admission to candidacy but does not guarantee it. A department will recommend advancement to candidacy only if satisfied with the student's performance in every aspect of the program, only after a dissertation advisor has been selected and a dissertation area determined, and only if the department is confident of the student's ability to complete the dissertation within the allotted time.

5. *The Degree of Master of Philosophy*—Upon departmental recommendation and approval of the dean, the degree of Master of Philosophy may be awarded to students who have been

advanced to candidacy and successfully completed all requirements for the Doctor of Philosophy degree up to and including the General Examination. Students requesting an M.Phil. degree must submit an application for graduation. Not all departments recommend students for this degree.

6. The Dissertation and Final Examination—A dissertation is required of each doctoral candidate as evidence of ability to perform scholarly research and interpret its results. The student normally enrolls for 12 to 24 hours of dissertation research after admission to candidacy. Dissertation Research must be taken in units of no less than 3 credits per semester.

When the dissertation has been approved by the director and the members of the Dissertation Research Committee, the candidate takes the Final Examination. A committee of examiners (composed of Columbian College faculty and outside scholars) conducts the examination. If the candidate passes, he or she is recommended to Columbian College for the degree of Doctor of Philosophy.

Doctor of Medicine/Doctor of Philosophy Dual Degree Program

A dual degree program is available to qualified students who seek both the Doctor of Medicine and Doctor of Philosophy degrees. The requirements that must be fulfilled for both degrees are identical to those currently and separately established in the School of Medicine and Health Sciences and Columbian College of Arts and Sciences. A student working toward these degrees may apply a maximum of 24 credit hours of approved course work in the School of Medicine and Health Sciences toward the Doctor of Philosophy degree. The estimated time for the completion of this dual program is six years. In order to enter the dual degree program, a prospective student must apply for and gain admission both to Columbian College and to the School of Medicine and Health Sciences separately through established procedures. Upon

admission to both schools, the student may then apply for affiliation with the dual degree program.

The Doctor of Psychology Program

1. *General Requirements*—The program leading to the degree of Doctor of Psychology requires the satisfactory completion of a minimum of 83 credit hours of approved graduate work. A maximum of 12 credit hours may be taken in courses offered by the other affiliated members of the Consortium of Universities. Doctor of Psychology students have an overall five-year time limit for completion of all degree requirements.

2. *Transfer of Credit*—Provisions are the same as those of the Doctor of Philosophy Program, above, except that up to 27 credits may be transferred into the program.

3. *The General Examination*—Each student is required to complete the General Examination no later than the beginning of the final semester of the program. A student who fails to pass any part of the General Examination may, in exceptional circumstances, and with the approval of the program, repeat the examination at the next scheduled examination date. If the student fails a second time, no further opportunity to take the examination is permitted, and the student's degree candidacy is terminated.

Further information on the requirements of the Doctor of Psychology degree appears under Professional Psychology in the Courses of Instruction.

Fellowships and Financial Aid

Many departments offer graduate teaching and research assistantships and fellowships; students should check with their department concerning funding opportunities. Graduate teaching assistants and University Fellows are appointed by the dean of the School, based on department recommendations. Other kinds of sponsored and University awards are also available. Awards

are based on academic excellence, and only full-time graduate degree candidates in Columbian College are eligible to be considered. Doctoral candidates receive preference in the awarding of full graduate teaching assistantship/fellowship packages. Doctoral candidates may be funded for a maximum of six years, M.A. and M.S. candidates for a maximum of two years, and M.F.A. candidates for a maximum of three years. No student will receive more than six years of University support altogether.

Students applying for admission who also wish to apply for a fellowship should submit a completed application for admission by February 1. Students currently enrolled in the College should also submit the fellowship application to their department or program by February 1 and should check with their departments concerning additional application requirements. Filing the fellowship application entitles the student to consideration for all awards available in the student's department.

International students applying for teaching assistantships should refer to Financial Aid, International Students, for regulations governing the appointment of international graduate teaching assistants.

Students who wish to apply for loans should indicate their intent to do so on the Graduate Admissions Application. Information concerning loans is contained in a booklet available from the University's Office of Student Financial Assistance; an overview of funding opportunities is available from the University's Office of Graduate Student Assistantships and Fellowships and at www.gwu.edu/~gradinfo.

Cooperative Programs

The American Studies Program at The George Washington University has a cooperative arrangement with the American Studies Program of the Smithsonian Institution. Members of the

staffs of the Smithsonian's American Studies Program, National Museum of American History, National Portrait Gallery, and National Museum of American Art offer seminars and tutorial instruction in fields that provide students with an unusual opportunity to develop new dimensions in the discipline of American civilization. This program of study is open to students working toward the degrees of Master of Arts and Doctor of Philosophy and is intended to prepare them for research, teaching, and museum-related careers.

In the Department of Fine Arts and Art History, students in the Master of Arts in the field of art history with a concentration in museum training may take internships in the Corcoran Gallery of Art, Freer Gallery, Hirshhorn Museum and Sculpture Garden, Museum of African Art, National Museum of American Art, Phillips Collection, Renwick Gallery, and Textile Museum.

The Museum Studies Program has forged strong relationships with more than forty local museums, historical houses, and government agencies. Each student is required to undertake 6 credit hours of internships—the equivalent of 520 hours of museum work. Most students elect to divide this requirement into two internships to maximize their exposure to different institutions and projects.

The George Washington University, in cooperation with two other universities and the Folger Shakespeare Library, helped establish the Folger Institute for Renaissance and 18th-Century Studies as a cooperative venture in graduate studies in the humanities. Fifteen universities are now member institutions. Seminars (limited to 12 students each) are offered each semester under the direction of American and foreign scholars. The Folger Library forms the core of the Institute. All participants enrolled in the seminars are granted access to the collections of rare books, manuscripts, and reference materials of the Library. All registered students are eligible to apply for admission to one or more of the seminars, although priority in enrollment

will be accorded graduate students working on dissertations and postdoctoral scholars from the sponsoring institutions. Further information, including a listing of seminar topics, is available at the Folger Shakespeare Library.

Graduate Certificate Programs

A number of CCAS departments and programs offer graduate certificates. Check with the department or program concerned (indicated here in italics when significantly different from the name of the certificate).

Art Therapy (30 credits)

Documentary Filmmaking—*SMPA* (9 credits)

Forensic Investigation (18 credits)

Museum Collections Management and Care (12 credits)

Museum Studies (18 credits)

Nonprofit Management—*SPPPA* (12 credits)

Women's Studies (18 credits)

Organizational Management—*Organizational Sciences* (18 credits)

Survey Design and Data Analysis—*Statistics* (12 credits)

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SCHOOL OF BUSINESS

Dean S. Phillips

Senior Associate Dean P.K. Bagchi

Associate Deans M. Tarimcilar, L.G. Singleton, K.E. Kumar

Organized as the School of Government in 1928, the School of Business has been responsible for over half a century for the professional development of individuals assuming leadership roles in

society. The School comprises nine departments—Accountancy, Decision Sciences, Finance, Information Systems and Technology Management, International Business, Management, Marketing, Strategic Management and Public Policy, and Tourism and Hospitality Management. The use of a multidisciplinary approach in educational programming helps prepare both the generalist and specialist for professional careers in today's complex, organizational society.

The School of Business is a member of AACSB International—The Association to Advance Collegiate Schools of Business, and the undergraduate and graduate programs in business administration and accounting are accredited by the Association.

Vision—To be a preeminent business school recognized for scholarly research, teaching excellence, and innovative curricula focused on the responsible management of organizations in the global environment.

Mission—To deliver an outstanding education, advance knowledge, and provide practical experience in diverse organizational settings, leveraging the unique advantages of our location in the Washington, D.C., area, in order to enhance the capacities of students, faculty, staff, alumni, and the business community to be productive and principled members of society.

Values—Integrity: demanding transparency, accountability, and ethical behavior; leadership: encouraging problem solving, commitment, and entrepreneurship; scholarship: emphasizing discovery, learning, and innovation; service: responding to the needs of students, academic professions, and the community; relationships: fostering communication, collaboration, and collegiality.

Students from Other Schools Within the University—Degree candidates from other schools of the University cannot register for more than 12 hours of credit from the Master of Accountancy, Master of Science in Finance, or Master of Business Administration degree programs.

The Master's Degrees

Entrance Requirements

To be considered for admission, applicants must present a bachelor's degree from a regionally accredited college or university. Admission to master's programs is highly competitive. Previous academic history, performance on the applicable entrance examination, letters of reference, motivation and aptitude to do graduate-level work, and professional experience are all taken into consideration.

Applicants for admission to programs leading to the Master of Business Administration must submit scores on the Graduate Management Admission Test; applicants for admission to the Master of Accountancy, Master of Science in Finance, and Master of Tourism Administration degree programs must submit scores on the Graduate Management Admission Test or the Graduate Record Examination. Test scores that are more than five years old are not accepted for admissions review.

Additional Requirements for International Students—Students from countries where English is not an official language and non-native English speakers are required to take the Test of English as a Foreign Language (TOEFL) or the academic International English Language Testing System (IELTS). A minimum score of 550 (paper-based) or 213 (computer-based) or 80 (Internet-based) on the TOEFL, or an overall band score of 6.0 on the academic IELTS with no individual band score below 5.0, is required for consideration for admission for all degree programs with the following exceptions. The Master of Accountancy, the full-time Master of Business Administration, the Professional Master of Business Administration, the Master of Science in Information Systems Technology, and the Master of Science in Project Management

require a minimum TOEFL score of 600 (paper-based) or 250 (computer-based) or 100 (Internet-based) or an overall band score of 7.0 on the academic IELTS with no individual band score below 6.0. In some instances, an interview will be required of applicants. All international students coming from countries where English is not an official language and non-native English speakers must take the GW English for Academic Purposes Placement Test. Only those students who score 600 (paper-based) or 250 (computer-based) or 100 (Internet-based) or higher on the TOEFL, or an overall band score of 7.0 on the academic IELTS with no individual band score below 6.0, will be exempted from this requirement.

Depending on the test results, the study of English for Academic Purposes may be required. The student may be restricted in the number and type of courses that can be taken. Students assigned English for Academic Purposes courses should anticipate additional related tuition expenses as well as a possible extended period of time required to complete their degree program.

Transfer Within the School—Currently enrolled students wishing to transfer from one graduate degree program to another within the School must complete a new application for admission through the appropriate degree program office. Applicants for transfer are subject to requirements in effect at the time of transfer. In addition, students must submit all required credentials no later than the established completion dates for the term for which the transfer is requested. Students must be in good academic standing (3.0 grade-point average) for transfer consideration.

Readmission—A student who withdraws, is suspended, or is otherwise absent without authorization from the University for one semester or more must make formal application for readmission to the director of the student's degree program and resubmit all supporting

credentials including transcripts from previous schools attended, including George Washington University, and entrance examination scores. If readmitted, the student is subject to the rules and regulations in force at the time of return. If the student has attended one or more regionally accredited colleges or universities during absence from the University, complete official transcripts must accompany the application for readmission.

The application fee is waived for a student applying for readmission who was registered as a degree candidate at the time of last registration at the University and has not since registered at another college or university.

General Requirements

All students must complete the prescribed minimum number of credit hours of graduate course work. A maximum of 6 credit hours of graduate course work may be approved for transfer to the School of Business from enrollment at GW in nondegree status or from another degree-granting school of this University, or another regionally accredited college or university under the following conditions: The course work must be approved as part of the student's program of studies; it must not have been applied to the completion of requirements for another degree, it must be at the graduate level, it must have been taken within the two years prior to acceptance into the program, and the student must have received a grade of *B* or better. A transcript and description of the course work must be on file before the petition can be considered. Should advanced standing be granted, the credit will count but not the grade.

Master's degrees are awarded by vote of the Faculty on completion of the required course work and completion of an acceptable thesis (if one is elected) in the chosen degree or field of concentration.

Courses numbered 101–200 may be counted toward the master's degree only when registration for graduate credit has been approved by petition at the time of registration by the director of the student's degree program. Written approval from the course instructor is also required. No work counted toward a bachelor's degree may be counted toward a master's degree; however, a student who has completed the equivalent of a Master of Accountancy or Master of Business Administration core prerequisite course with a grade of *B* or better as part of the bachelor's degree program may request a waiver of that course at the master's level. A grade of *B* or better is required to waive remaining core prerequisite courses on the basis of equivalent graduate-level courses completed at GW or another AACSB accredited college or university prior to admission to the program. All courses presented for waiver consideration must have been taken within five years prior to the first semester of enrollment into the program. Students should contact their degree program director for specific waiver criteria and deadlines for requesting waivers.

A full-time student may register for a minimum of 9 to a maximum of 15 credit hours each semester and 6 credit hours each summer session. Excluding those enrolled in the Professional Master of Business Administration, a graduate student who is employed more than 20 hours a week may not take more than 9 credit hours each semester and 3 credit hours each summer session. All work for a master's degree must be completed in five years.

Students who expect to continue studies for a doctoral degree after receiving the master's degree should ask for assistance in planning their programs of study.

No credit is granted for work done in absentia or without formal instruction, except for supervised field experience, independent study, and the thesis, which may be completed in

absentia with the permission of the department, designated faculty advisor, or committee concerned.

Independent Study Plan—A graduate student of demonstrated capacity, with a special interest in the subject matter of a course, may be permitted to undertake study under the personal direction of an instructor, in accordance with the rules of the appropriate department. Credit under this plan is limited to the specific credit hours normally allowed when a course is taken on a class basis. A petition outlining the student's specific study plan must be submitted to the student's degree program director prior to beginning any independent study. The student may petition to complete a maximum of two independent studies in two separate semesters.

Scholarship Requirements

The University's general scholarship requirements, including information on grades and computing the grade-point average, appear under University Regulations in this Bulletin. A minimum grade-point average of 3.0 must be maintained and is required for award of a graduate degree. All graduate courses and undergraduate courses taken for graduate credit after matriculation as a degree candidate (except those audited or taken for the grade of *CR*) will be used in the calculation of the grade-point average.

Probation—A student whose grade-point average falls below 3.0 at any point after completing 9 credit hours will be placed on probation. This probation extends through the period in which the student next attempts up to 12 credit hours of work, including prescribed courses. A student's program may be restricted by the program director if deemed necessary. During this period, the student's performance will be monitored to determine suitability for continued study. A student who fails to raise the cumulative grade-point average to 3.0 or better during the period of probation will be suspended. Incomplete grades are not allowed during the probation period.

and are grounds for automatic suspension. A student who is subject to probation for a second time at any point during the program is automatically suspended.

Grade of F—A master's degree candidate who receives a grade of *F* is required to present cause, for consideration by the director of the student's degree program, as to why continued study should be permitted. Once a grade of *F* is earned in a core, required, or elective course, it remains a part of the student's permanent record and is calculated into the grade-point average. A master's degree candidate given the grade of *F* in a core or other required course, and permitted to continue in graduate studies, must repeat the course and achieve at least the grade of *B*. If the grade earned is below *B*, the student will be denied further registration as a degree candidate.

Suspension—A graduate student who does not meet the conditions of probation (see above) will be suspended. A student who is suspended or withdraws under these conditions may apply for readmission after the lapse of one semester. An outstanding Incomplete grade at the time of suspension will become an *F*. To be readmitted the student must submit evidence that indicates academic success if readmitted. A student so readmitted will continue on academic probation and must achieve a minimum grade-point average of 3.5 in the next 12 credit hours of graduate study. Should the student fail to achieve this minimum grade-point average, a second suspension will result and subsequent readmission will be denied.

Incompletes

Conditions under which the symbol *I* (Incomplete) may be assigned and changed are described under University Regulations. The symbol *I* must be changed by a date agreed on by the instructor and the student but no later than the last day of the examination period for the fall or spring semester immediately following the semester or summer session in which the symbol *I* is assigned. An Incomplete that is not changed within this period automatically becomes an *IF*. In

cases of well-documented extenuating circumstances, an instructor and a student may jointly petition the director of the student's degree program for additional time in which to complete the work of the course. Such petitions should be submitted within the same period. The symbol of *I* cannot be changed by reregistering for the course here or by taking its equivalent elsewhere, and remains on the student's permanent record even after the course has been successfully completed.

Thesis

Students contemplating doctoral study are strongly urged to include the thesis as an elective in their master's program. The thesis subject should be selected as early as possible to permit effective integration with the course work.

The subject must be approved by the professor in charge of the student's field. The thesis in its final form must have the approval of the professor in charge. All theses must be submitted electronically and meet the formatting and other requirements set forth on line at www.gwu.edu/~etds.

Payment of tuition for the thesis entitles the candidate, during the semesters in which registered for thesis seminar (299) and/or thesis research (300), to the advice and direction of the member of the faculty under whom the thesis is to be written. In case a thesis is unfinished, additional time is granted. The student must, however, be enrolled continuously in the program. If the preparation of the thesis extends more than three semesters beyond the date registered for thesis research, the student must register for the entire required hours of thesis again and pay additional tuition.

Master of Accountancy

The Master of Accountancy program is designed to be flexible, allowing students to prepare for the fields of financial management, public accounting, and taxation. The program may be pursued on a full-time or part-time basis.

The program requires 30 to 38 credit hours. Accy 201 and 202 and MBAd 250 are required, but each may be waived on the basis of approved prior preparation with the substitution of another course. Econ 220 and MBAd 220 may each be waived on the same basis and do not require substitution of another course.

In addition, students who hold a B.Accy. take 12 credits within the Department of Accountancy and 12 credits within the School of Business (which may include courses in accountancy); students who do not hold a B.Accy. take 15 credits with the Department of Accountancy and 12 credits within the School of Business (which may include courses in accountancy). Students who intend to take the C.P.A. examination should be aware that the course work required for admission to the examination varies from state to state. Students are advised to consult the Board of Accountancy for the state in which they plan to take the examination and choose electives that meet that state's requirements.

Master of Business Administration

The Master of Business Administration is designed to prepare students for careers in management and leadership positions in both the private and public sector. Students acquire a comprehensive foundation in the fundamentals of business, the global environment in which they will function, and the analytical tools for sound decision making. Students may apply to the Full-time M.B.A. program, the Professional M.B.A. program (part-time), or the Executive M.B.A. program, depending on academic and professional background. International students who must maintain full-time status for student visa requirements may apply to the Full-time M.B.A.

program or the accelerated format of the Professional M.B.A. program and should see minimum TOEFL or IELTS requirements described under the School of Business entrance requirements. Requirements for both the Full-time and Professional M.B.A. programs are described immediately below. See www.gwu.edu/~business/emba for the Executive M.B.A. program, which is briefly described under Special Programs at the end of this section.

Full-time Master of Business Administration

The full-time M.B.A. program is a 57-credit-hour program designed for individuals with a minimum of three years' work experience who are planning to take a career break to dedicate to a comprehensive one-and-one-half to two-year period of study. During the first year of the program, students work in a cohort to complete a core curriculum divided into four modules that provides experience in the School's core values of ethics, leadership, globalization, and teamwork.

The first module concentrates on these values with course work that includes corporate responsibility and sustainability, leadership and organizations, and global perspectives. The second and third modules emphasize tools for business analysis with course work that includes micro- and macroeconomics for the global economy, data analysis and decisions, financial and managerial accounting, and financial markets. The fourth module has a strong international focus, culminating with the international residency, in which students work with a company on a real-world overseas project. A representative from an international business briefs students about a specific problem in an overseas market, and students develop a case study detailing how they would resolve the issue. Students then travel to the host country, where they provide recommendations to company executives as part of a final presentation.

The GLOBE (Global Leadership of Business Enterprise) requirement is a series of workshops, seminars, and site visits integrated into the core curriculum and offered throughout the first-year cohort experience. Topics include business ethics, cross-cultural management, career development, total quality management, and many others. Site visits may be conducted to companies and agencies in the Washington metropolitan area.

The second year of the program consists largely of electives and capstone courses. The capstone courses in entrepreneurship and business strategy have intramural case-based competitions that encourage students to draw on all the core knowledge they have acquired in the program. Students customize their studies by selecting elective course work in their particular areas of interest and by choosing their pace of study—the program can be completed in 16, 19, or 21 months.

Changes to policies governing transfer credit, residence requirements, course waivers, and proficiency exams are being developed as this Bulletin is prepared for press. Current information can be found at www.mba.gwu.edu or by contacting the M.B.A. program office.

Professional Master of Business Administration

The Professional M.B.A. program is designed to provide the highest quality educational experience to part-time students who are currently holding full-time professional positions. The curriculum incorporates consistent emphasis on application of concepts and analytical tools to current management problems. There is a focus on teamwork and communication skills in team projects with an emphasis on real-world private- and public-sector issues.

The program closely mirrors the full-time M.B.A. described above, except that students in the Professional M.B.A. are not required to complete the International Residency component, thereby reducing required credit hours to 52.5 instead of 57. However, Professional M.B.A.

students wishing to participate in an International Residency may do so as part of their elective course work.

The program has two delivery options:

Accelerated cohort schedule—The accelerated cohort is designed for fully employed, mid-level managers with at least three years of professional experience who seek an intense graduate education while continuing to work full time. In addition to the general entrance requirements, a personal interview is required of candidates for the accelerated cohort.

The accelerated format includes one weekend residency prior to the first semester, followed by an intense schedule of core and integrative courses taking place one evening per week and Saturdays. The core is completed in four consecutive semesters (including summer) as a cohort class. Students are then free to select elective course work for the next two semesters to complete degree requirements.

Flexible schedule—The flexible delivery option is designed for fully employed, mid-level managers with at least three years of experience who seek a flexible, self-paced graduate education while continuing to work full time. In addition to general entrance requirements, a personal interview is recommended. Accepted students may begin the program in the fall or spring semester and register for one or more courses each semester, as appropriate, to complete their degree requirements. Students have up to five years to complete their program on a self-paced schedule.

Changes to policies governing transfer credit, course waivers, and proficiency exams are being developed as this Bulletin is prepared for press. Current information can be found at www.pmba.gwu.edu or by contacting the M.B.A. program office.

Master of Science in Finance

The Master of Science in Finance degree is designed to prepare students with specific career interests in the areas of financial management and research. The program of study emphasizes the theoretical foundations of finance and quantitative methods in financial management. Students will be engaged in applied research and modeling using a variety of data sets and computer software packages. The curriculum provides in-depth study of the international and federal government regulatory dimensions of finance.

The Master of Science in Finance program consists of 48 credit hours of course work: Fina 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282. In addition, 6 credit hours each in calculus and economics and 3 credit hours each in financial accounting, managerial finance, and statistics are prerequisite.

The degree program is designed to be completed in either 12 months of intensive study including a summer session or 24 months of regular study including two summer sessions. Students with very strong backgrounds in a particular subject area can petition to waive up to 8 credits of required courses to be replaced by electives as approved by the program director.

Master of Science in Information Systems Technology

The Master of Science in Information Systems Technology is designed to provide students depth of understanding in a selected major field. The program offers three fields of concentration: information systems development, information systems project management, and management information systems. Students have the option of combining two of these major fields within the program. In addition to the fields listed here, the Executive Master of Science in Information Systems Technology is offered on the Virginia Campus.

Applicants with deficiencies in preparation may be required to take prescribed background courses, remedial workshops, or other forms of preparation before beginning course work in the

program. Although scores are not required, applicants who have not previously demonstrated strong academic performance in a related field should submit GRE or GMAT examination scores as additional evidence of their capability to perform competitively at the graduate level.

The program consists of 30 to 33 credit hours of graduate course work.

Information systems development—ISTM 280, 282, 284, 287; four technical electives chosen from other M.S.I.S.T. courses; and two 3-credit general electives.

Information systems project management—Mgt 210, 215; DnSc 224, 261; ISTM 230, 280, 282, 284, 287; and two technical electives chosen from other M.S.I.S.T. courses.

Management information systems—Mgt 201; DnSc 226, 261; ISTM 271, 280, 282, 284, 287; and two 3-credit electives chosen from a list of specified courses or as approved by the advisor.

Master of Science in Project Management

The Master of Science in Project Management degree program is designed for professionals who want to enhance their ability to motivate people, integrate complex projects, and achieve cost-effective results. The curriculum focuses on traditional and modern techniques of managing projects in areas that range from new product development to mergers and acquisitions. The degree program is offered both on campus and by distance learning.

The program consists of 36 credit hours of graduate course work. The required courses are Accy 201; Mgt 201, 215; DnSc 202, 224, 261, 267, 268; and two specified offerings of Mgt or DnSc 290; and two School of Business electives approved by the advisor.

Master of Tourism Administration

The Master of Tourism Administration degree program is designed to prepare students for career entry or mid-level management positions in public, commercial, or nonprofit organizations providing visitor services at the local, national, or international level. Students have opportunities

to learn from culturally diverse colleagues and from a wide range of visitor-service organizations, as well as from the classroom. Students may choose one of the three formal concentration areas below or may develop an individualized studies program in hospitality management, heritage tourism management, or ecotourism. The degree program is offered both on campus and by distance learning.

The program consists of 36 credit hours of course work consisting of three core courses (TStd 249, 251, 270), courses in the field of concentration as outlined below, electives, and two capstone courses (either TStd 283 and 297 or TStd 299 and 300).

Sustainable destination management: TStd 260, 261, 262, 263.

Event and meeting management: TStd 276, 277, 278, 279.

Sport management: TStd 264, 265, 266, 267.

Individualized studies: The student designs a plan of study and provides a brief justification specifying the courses to be taken, and submits it by petition through the faculty advisor.

Doctoral Program

The Committee on Doctoral Studies administers and supervises the Doctor of Philosophy in the field of business administration.

The minimum admission requirement is a bachelor's degree from a regionally accredited college or university, although most applicants have completed a master's degree in an appropriate field. Applicants whose degrees are in fields other than their proposed area of focus are expected to obtain the necessary background either before or soon after admission to the program. Scores on the Graduate Record Examination or the Graduate Management Admission Test are required: Scores may not be more than five years old. Students whose native language is not English must also submit minimum Test of English as a Foreign Language (TOEFL) scores

of 600 (paper-based) or 250 (computer-based) or 100 (Internet-based). The Doctoral Committee does not use specific cutoff points for grade averages and test scores. It carefully reviews each applicant's entire record and makes its selection on a competitive basis in keeping with enrollment limitations.

The doctoral program consists of two major parts: the pre-dissertation stage and the dissertation stage. The pre-dissertation stage is based on an individual study plan developed by the student under the guidance of a committee of at least three faculty advisors. All students, regardless of their specific interests, must include in their study plan two doctoral-level courses in statistics, as well as doctoral-level courses in philosophical foundations of administrative research, organization theory, and research methods. A qualifying examination covering the content of these five doctoral-level courses is administered at the end of the first year, and a research paper is required during the summer after the first year. The objective of the dissertation stage is to have the student apply the obtained theoretical and practical knowledge and analytical methods to the resolution of a research problem. The research should be original and is expected to result in a contribution, either applied or theoretical, to the existing body of knowledge.

All course work, other educational activities, and required comprehensive evaluations must be completed within five years of matriculation. The total program must be finished in seven years, although extensions may be granted in unusual circumstances.

For more detailed information on the program and its administration, see the Handbook on the Doctoral Program, available in the Doctoral Program Office.

Special Programs

Executive Master of Business Administration

The Executive Master of Business Administration program is designed for accomplished managers and professionals to enhance their organizational effectiveness. The program has a general management focus, with a strong emphasis on strategy and leadership. Executive Master of Business Administration courses are limited to 30 to 35 individuals who form a cohort, taking all classes together over 21 months (18 months of instruction with a summer break between the first and second year). Classes are conducted one full day each week on alternating Fridays and Saturdays. The 56-credit program includes nine core courses, 12 advanced topics courses, two week-long domestic residencies, and a two-week-long multi-city international residency. See Executive Master of Business Administration under Courses of Instruction.

Executive Master of Science in Information Systems Technology

The Executive Master of Science in Information Systems Technology is a 36-credit multidisciplinary program for high-potential, mid-level managers and senior executives. The curriculum focuses on the role of information systems and behavioral and decision sciences in problem solving and decision making. The program is designed to meet the needs of individuals from a variety of professional and educational backgrounds; applicants generally are expected to have a minimum of seven years of professional experience. The program enrolls one cohort per year, with a fixed sequence of courses during a 15-month period. Classes meet on alternating Fridays and Saturdays. The faculty consists of a core of full-time professors, augmented by recognized leaders in particular disciplines and distinguished guest lecturers from government and industry. Courses in this program are listed in the 400 series under Information Systems and Technology Management.

Joint Degree Programs

Students may work concurrently toward both the Juris Doctor degree in the GW Law School and the Master of Business Administration in the School of Business. In consultation with their faculty advisors, students in these programs may transfer up to 14 credits of Law School course work to their M.B.A. program and 12 credits of School of Business course work to fulfill requirements for the J.D. Students must be admitted separately both to the Law School and to the School of Business and must meet all requirements in each degree program prior to receiving either diploma. It is possible for a student to complete work for both degree programs within four years.

In addition, a joint degree program is offered with the Elliott School of International Affairs. The joint Master of Business Administration and Master of Arts is available to students who plan a focus on international business. As part of this program, each School accepts up to 12 credit hours of course work from the other school in fulfillment of its degree requirements. Students must be admitted separately both to the School of Business and to the Elliott School of International Affairs and must meet all requirements for each program prior to receiving either diploma.

Within the School of Business, students may elect a joint Master of Business Administration and Master of Science in Finance. Students must be admitted simultaneously to both degree programs to be eligible for the joint degree.

School of Business Post-Master's Graduate Certificate

The School of Business Post-Master's Graduate Certificate is designed to provide School of Business master's degree alumni an opportunity to build upon their previous graduate study to keep pace with today's business climate. Participants may undertake a 12-credit program of

study in an existing School of Business field or from a series of specially designed program offerings. Further information is available from the Office of the Dean.

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GRADUATE SCHOOL OF EDUCATION AND HUMAN DEVELOPMENT

Dean M.H. Futrell

Associate Deans J.C. Heddesheimer, R.N. Ianacone, J. Gomez (*Interim*)

The Graduate School of Education and Human Development prepares teachers, human resource leaders, counselors, and administrators for professional service. The School also offers opportunities to experienced professionals to extend and enrich their education. The programs are designed to meet the broad needs of persons who seek knowledge and skills necessary to provide effective learning and teaching, research, services, and leadership in a variety of settings that cover the entire life span.

The Graduate School of Education and Human Development is accredited by the State Education Agency–Board of Education of the District of Columbia and the National Council for the Accreditation of Teacher Education (NCATE).

The Graduate School of Education and Human Development is the administrative unit for three departments: Counseling/Human and Organizational Studies, Educational Leadership, and Teacher Preparation and Special Education. In addition to programs of study leading to its degrees, the School offers credit and noncredit workshops designed to meet the unique needs of metropolitan area school systems and other clientele in industry and government.

Special curricula are individually tailored for liberal arts graduates and graduates of other professional schools who are interested in teaching or in other human services areas. The School also offers a wide range of courses for teachers who wish to pursue advanced studies and additional endorsements and for provisional teachers who wish to prepare for teaching certificates.

Laboratory and clinical facilities are provided by the Community Counseling Service Center and Office of Laboratory Experiences, which are responsible for internship placements in the community. Field experiences are provided in cooperation with public and private schools, social and health agencies, museums, institutions in the business community, institutions of higher education, nonprofit and professional associations, and the federal government. Some programs and courses are also offered at off-campus locations or via distance learning.

Mission Statement—Strategically based in the nation's capital and serving the global community, the Graduate School of Education and Human Development prepares informed and skilled leaders through innovative teaching and learning practices that enhance and enrich theory, policy, and practice by engaging in scholarly inquiry and research; promote equity, diversity, and inclusion reflective of changing societies; create public and private partnerships; and advocate continuous self-examination and critical analysis.

Bridging Concepts—The following bridging concepts are central to the unified conceptual framework of the School and weave through the mission, goals, and initiatives of its strategic plan.

Research and scholarship are prerequisite to the improvement of educational practice.

Leadership is critical in the reform and redesign of education and human service at all levels.

Building reflective practitioners through integration of theory and practice must be a focus of all programs.

A community of diverse learners is prerequisite to success in the education and human service professions.

Teacher Certification Preparation Programs

Programs are available to prepare students for teacher licensure in elementary, secondary, and special education through the Master of Arts in Education and Human Development, Master of Education, and Education Specialist degree programs. Students who plan to prepare for licensure must apply to the appropriate degree program. These degree programs are also available to credentialed teachers seeking additional endorsements.

In accordance with the 1998 Amendments to the Higher Education Act, Title II, Section 207, The George Washington University Graduate School of Education and Human Development provides required information in response to any request by potential applicants, guidance counselors, and prospective employers. An information sheet is included with all distributed materials and can also be viewed on the web at gsehd.gwu.edu.

GSEHD Regulations

Grades

Information on grades and computing the grade-point average is found under University Regulations.

The symbol *I* (Incomplete) indicates that a satisfactory explanation has been given to the instructor for the student's failure to complete the required work of the course. The *I* remains on

a student's record for one calendar year; if work for the course is not completed within the calendar year, the grade converts to *IF*. If the work is completed within the designated time period and a grade is assigned, the grade is indicated in the form of *I*, followed by the grade. The indication of *I* cannot be removed from the transcript.

Scholarship

A grade-point average of 3.0 is required for graduation. Students who receive a grade of *C* in more than 6 credit hours are subject to suspension. Students who receive a grade of *F* must confer with the dean before enrollment for further course work is allowed. More detailed information for doctoral students can be found in the Doctoral Student Handbook.

Continuous Enrollment and Maintaining Residence

Students must be continuously enrolled in GSEHD unless the dean grants a leave of absence. Failure to register each semester of the academic year will result in lapse of candidacy. Subsequent readmission is subject to whatever new conditions and regulations have been established by the School. See Continuous Enrollment Status under University Regulations.

When master's degree candidates are sitting for a comprehensive examination and are not otherwise enrolled in course work, they may prepare for and sit for the exam in continuous enrollment status. All doctoral students and those master's students who elect to take an additional semester to prepare for the examination or who must retake the examination are required to sign up for the examination preparation course, which carries a fee equivalent to 1 credit hour of tuition. See Master's Comprehensive Examination, below.

Leave of Absence

Students who, for personal reasons, are temporarily unable to continue their program of studies may request a leave of absence for a specific period of time not to exceed one calendar year during the total period of degree candidacy. If the request is approved, the student must register for leave of absence each semester. If a student fails to register, degree candidacy is terminated. After reaching the one calendar year limit, students who are requesting to register in leave of absence status for additional semesters must seek approval for further time in this status from the appropriate appeals committee.

PRAXIS Teacher Assessments

All degree programs preparing students for teacher licensure require completion of the Educational Testing Service PRAXIS teacher assessments as specified by the State Education Agency–Board of Education of the District of Columbia.

International Students

In addition to all listed criteria for admissions, students from countries where English is not an official language are required to take the Test of English as a Foreign Language (TOEFL) or the academic International English Language Testing System (IELTS). A minimum score of 550 (paper-based) or 213 (computer-based) or 80 (Internet-based) on the TOEFL, or an overall band score of 6.0 on the academic IELTS with no individual band score below 5.0, is required for consideration for admission. All international students coming from countries where English is not an official language must take the GW English for Academic Purposes Placement Test. Only those students who score 600 (paper-based) or 250 (computer-based) or 100 (Internet-based) or higher on the TOEFL, or an overall band score of 7.0 on the academic IELTS with no individual band score below 6.0, will be exempted from this requirement.

Depending on the test results, the student may be restricted in the number and type of courses that can be taken. Students assigned English for Academic Purposes courses should anticipate additional related tuition expenses as well as a possible extended period of time required to complete their degree program.

The Degree of Master of Arts in Teaching in the Field of Museum Education

The Graduate School of Education and Human Development offers an intensive interdisciplinary program in museum education. The program is designed to prepare graduates for work fulfilling the educational mission of art, history, or science museums; zoos, aquaria, or nature centers; and historical societies or sites. Graduates also qualify to serve as liaisons between schools and museums and as professionals in museum-related private and public agencies.

Those interested in museum studies more generally should refer to Museum Studies under Courses of Instruction.

Admission Requirements

To be admitted to the program in museum education an applicant must have a bachelor's degree from an accredited institution; present a statement of purpose and two written references attesting to quality of academic record and work experience; submit scores on either the Graduate Record Examination or the Miller Analogies Test and transcripts from each institution attended; and be interviewed by the Selection Committee or make alternative arrangements specified by the Committee. A desire to broaden the museum audience and an interest in human development and learning are essential. Evidence of strong undergraduate, graduate, or

professional experience in such fields as American studies, anthropology, art history, fine arts, history, or the biological, physical, or social sciences is desirable.

Plan of Study

All degree candidates take seven sequential core courses in four successive semesters beginning in June and ending in July of the following year. Each student also pursues two elective courses in a chosen museum-related academic discipline, museology, or education. Two carefully supervised field placements provide direct museum education experience. In the fall semester, students serve two days a week as museum resource specialists in an educational site. In the spring semester, students hold four-day-a-week internships in a museum or museum-related organization. The program requires 33 credit hours.

The Degree of Master of Education

Elementary Education—The Master of Education in the field of elementary education is designed for those with an undergraduate degree in the arts and sciences. The 39-credit-hour program includes course work for students who wish to become eligible for licensure/certification for teaching at the elementary school level (grades 1–6); additional course work in content areas may be needed to meet specific jurisdictional requirements for licensure/certification.

Secondary Education—The Master of Education in the field of secondary education is designed for those with an undergraduate degree in the arts and sciences. Students are expected to have had substantial course work in an academic field taught in secondary schools. Degree candidates may specialize in art, computer science, English, English as a second language, foreign languages, mathematics, science, or social studies. The minimum 36-credit-hour program includes the course work leading to eligibility for teacher licensure/certification; specific course

work in the subject area to be taught may be needed to meet jurisdictional requirements for licensure/certification.

The Degree of Master of Arts in Education and Human Development

The degree programs leading to the Master of Arts in Education and Human Development are designed to provide students with specialized knowledge and skills required for advanced professional competence in a variety of educational, human development, and service industry careers. Each program of study involves a combination of classroom and field-based learning experiences tailored to a professional specialty and individual student needs. Students engage in a wide range of teaching and research approaches that reflect the School's commitment to excellence in professional education.

The diversity of master's programs in the Graduate School of Education and Human Development reflects its belief that education and human development comprise a multifaceted enterprise reaching persons of all ages in a variety of settings. These programs develop professional knowledge, skills, and attitudes that will enable graduates to foster learning, growth, and development in individuals throughout society. Depending on the program specialty, students are prepared to pursue careers in schools, universities, community-based and human service organizations, cultural and leisure institutions, and business and government settings.

Master's programs are available in the fields listed on the following pages.

Counseling—The master's programs in counseling are designed to provide three specialty concentrations and one subspecialty concentration for entry-level positions in professional counseling. Program graduates are prepared to specialize in a specific field and to work in a variety of settings in which professional counseling is offered. All counseling concentrations require the equivalent of two full years of study and provide core learning experiences that

combine professional and behavioral studies with supervised laboratory, practicum, and internship experiences. Some programs have specific prerequisites in addition to the general admissions requirements. The master's programs in school counseling and clinical mental health counseling and the doctoral program in counseling are accredited by the Council for the Accreditation of Counseling and Related Educational Programs. The master's program in rehabilitation counseling is accredited by the Council on Rehabilitation Education.

Students who successfully complete a graduate program in counseling are eligible to apply for certification by the National Board of Certified Counselors. Students who successfully complete the graduate program in rehabilitation counseling are eligible to apply for certification by the Commission on Rehabilitation Counselor Certification. State licensure and certification are available in most states, and requirements vary by state. The core course of studies for all program concentrations includes course work in the foundations of counseling, human behavior and development, professional ethics, mental health problems, testing and assessment, career development, individual and group counseling, cross-cultural counseling, and research and statistics.

Clinical Mental Health Counseling—This 54-credit-hour program prepares graduates to enter the counseling profession in a variety of human service settings, including welfare and other social service agencies, mental health centers, penal institutions, court systems, employment centers, allied health agencies, government service agencies, community college counseling centers, employee assistance programs, and private practice. A subspecialty in employee assistance counseling is available to prepare counselors for business, industry, and government settings.

School Counseling—This 48-credit-hour program provides professional preparation for individuals to become certified as counselors in public and private schools. The program is designed to provide students with the requisite knowledge and skills to provide professional counseling, assessment, consultation, and guidance services in a school setting.

Rehabilitation Counseling—This 48-credit-hour program prepares rehabilitation counselors to help persons with emotional, mental, and physical disabilities to live independently or return to work. The rehabilitation counselor works jointly with the consumer of rehabilitation services to make vocational and independent living choices and plans. In accordance with accreditation requirements of the Council on Rehabilitation Education, students can receive a 6-credit waiver (thereby completing the program with a minimum of 42 credit hours) under the following circumstances: The student must hold a bachelor's degree that includes two graduate-level courses in rehabilitation counseling and must receive approval from the advisor for the waiver upon admission to the program.

Curriculum and Instruction—This program prepares teachers and other educational personnel for increased responsibilities in the planning, implementation, research, and evaluation of curriculum and instruction. A minimum 36-credit-hour program includes study in curriculum development, research and evaluation of instructional practice, teacher education, work with special populations, and school policy and leadership. A program specialization may include reading and literacy, advanced study in elementary education, a content area of secondary education, early childhood special education, or special education. The National Board for Professional Teaching Standards core propositions are integrated throughout all areas of study. An internship is required. Licensure is an expectation on admission.

Education Policy Studies—The program is designed for students who wish to develop skills in policy research, program evaluation, and the technical, political, and managerial aspects of education policy. Emphasis is placed on developing both an understanding of the political and social environments affecting education policy and the competencies needed to develop policy options, analyze their potential, select the most promising, implement policies effectively, and evaluate impacts. Internships are offered in a variety of federal, state, and local agencies. The 36-credit-hour program includes 12 elective credits that can be used for courses, independent research, and internships in federal, state, or professional organizations.

Educational Leadership and Administration—This program prepares students for various school-based and central office leadership positions, for supervisory positions, and for increased responsibility in teaching. The program is designed to prepare graduates for advanced levels of professional responsibility in diverse school communities and to increase their technical, conceptual, political, and leadership skills. Emphasis is on leadership and management, change, communication, organizational learning, administrative and legal issues, human relations, human resource development, general supervisory principles and responsibilities, and supervision of instruction.

The 33-credit-hour program includes courses and field experiences designed to meet administrative certification requirements in the District of Columbia, Maryland, Virginia, and some other states.

Educational Technology Leadership—This program is designed for persons who are entering or advancing in positions associated with schools, higher education, alternative educational settings, or other human service occupations in which computers and related information delivery technologies are used. The program of studies provides students with

opportunities to develop the knowledge, understanding, and skills necessary to provide leadership in the rapidly changing environment of technology in education.

The 36-hour program includes required course work in the theory and practice of educational technology, including the use of computers and other instructional technology systems, technological management systems, policymaking, research methods, and leadership. The pioneering program is delivered via interactive distance education to students around the world. Nine hours of the program are specialization electives.

Higher Education Administration—This program prepares students for administrative positions in institutions of higher education, associations, national and international government agencies, and business and industry related to education. The program is designed so that a student may select a concentration in general administration, student affairs administration, higher education policy, international higher education, college teaching and academic leadership, and higher education finance. The course of study is organized in five parts: (1) an introduction to the world of higher education (how U.S. higher education evolved, the breadth of the U.S. system of higher education, and the administrative and governance structure of U.S. colleges and universities); (2) research design and analysis; (3) the concentration (in-depth focus on a particular aspect of higher education and its administration); (4) application electives (including internships and practica); and (5) leadership integration. All concentrations require a 33-credit (with comprehensive examination) or 36-credit (without comprehensive examination) program.

Human Resource Development—This program is designed for persons entering or advancing in positions associated with learning in organizational settings in all sectors of society. Typical careers are in organizational development, internal and external consulting, and training

and development. The program is interdisciplinary, and students are encouraged to tailor their programs to individual career needs and objectives.

The eight required courses in the 36-credit-hour program include foundations and issues of human resource development, adult learning, group dynamics, research methods, organizational diagnosis, and either strategic human resource development or assessing the impact of human resource development efforts. Fieldwork in cooperating Washington-area business, industry, government, and community organizations may be a part of the learning experience.

Individualized Program—This program provides the opportunity to develop an individualized curriculum that cuts across existing fields, both within the Graduate School of Education and Human Development and between the School and other schools and departments of the University and the Consortium. The program is designed to meet specific career and professional objectives of applicants who have unique needs. The flexible program structure can be tailored to prepare for new and emerging fields in education and human development. This 36-credit-hour program is available within or across the three departments of the Graduate School of Education and Human Development. The program must contain a 12-credit-hour core curriculum consisting of courses in human development, social/historical/philosophical foundations in education, and curriculum. The remaining 24 credit hours must correspond directly to the program objectives and bear a direct relationship to each of the areas identified above. A minimum of 6 credit hours of fieldwork, or the equivalent, must be a part of the program. All work toward the degree must be specified at the time the initial program is developed.

International Education—This program is designed for persons who are entering or advancing in positions associated with training, education, adult learning, and development

activities in diverse settings that require international understanding. The program aims toward preparation of leaders to bring about improvements in developing education systems. Students acquire knowledge of other countries and cultures, using the education system as a means of interpreting and translating knowledge across cultures and analysis of the formal and nonformal school systems as they reflect history, culture, development, values, contemporary concerns, and future trends. In addition, students acquire tools, methods, and habits of analysis that enable them to play a variety of roles as leaders and change agents.

The program, which requires a minimum of 33 credit hours, allows a selection from a variety of subspecialization areas. A minimum of 15 credit hours is required in the international education studies area. A 9-credit subspecialty complements the major area of study and may be taken in any division of the University. Up to 6 additional credit hours of internship may be required for students who do not have international education related experience.

Special Education—The master's programs in special education provide core and specialty studies and field experiences designed to prepare highly competent and committed professionals for a broad range of educational and leadership roles in the field of special education and related services.

Bilingual Special Education—This 45-credit-hour program is designed to prepare educators to address the changing demographics of classrooms. Graduates are eligible for licensure in K–12 special education, K–12 ESOL/bilingual education, and bilingual special education. Program course work and field experiences are designed to build competence in the areas of assessment, programming, and teaching, with a focus on culturally and linguistically diverse students. Graduates will be prepared to work with students who have disabilities and those in the process of second language acquisition. Students complete field experiences throughout the duration of

the program. This program is designed for already licensed teachers or other related service professionals.

Early Childhood Special Education—This program prepares educators in the areas of development of infants and young children evidencing developmental delay, identification and assessment procedures, and clinical teaching and alternative models of service for children with, or at risk for, disabilities. The program prepares students for interdisciplinary work with infants, birth to three, and children from three to eight.

The 39-credit-hour program includes courses in language development, typical and atypical development, formal assessment, interdisciplinary theory, family intervention skills, behavior management, and legal and policy concerns. A practicum and internship are required.

Special Education for Children with Emotional and Behavioral Disabilities—This 39-credit-hour program of study requires a two-semester clinical internship at an elementary and middle school serving children with emotional and behavioral disabilities. Students are involved in course work and clinical experiences with professionals from various allied mental health fields. The program is designed to develop competencies in the nature and needs of troubled children; assessment, programming, and teaching; and working effectively as an interdisciplinary and interagency team member. The program provides eligibility for licensure certification in the area of emotional disturbance; it is available to both full-time and part-time students.

Transition Special Education—This interdisciplinary program prepares educators and support personnel to address the needs of youth and young adults with special needs for careers and transition from school to postsecondary education, employment, and independent self-adjustment. Teacher licensure certification preparation in categorical learning disabilities or noncategorical special education is available through the program. The curriculum integrates the

roles of relevant disciplines and service agencies, including postsecondary planning, alternative service models, and extended career support and adjustment to independent living. The program requires 39 credit hours of graduate course work, practicum, and field-based professional practice and research. Students can plan their programs to emphasize secondary and career programming, learning disabilities, collaborative vocational evaluation, traumatic brain injury, corrections, and business–education partnerships.

Admission Requirements for the Master of Education and Master of Arts in Education and Human Development

The Graduate School of Education and Human Development seeks applicants with strong academic potential, high motivation, and aptitude to do graduate-level work. Admission decisions are based on an evaluation of all material submitted in support of the application. The School requires a bachelor's degree from an accredited institution, official transcripts of all previous undergraduate and graduate course work, and acceptable test scores on either the Graduate Record Examination or the Miller Analogies Test. In the field of human resource development, the Graduate Management Admission Test is acceptable as well.

Two letters of recommendation and a statement of purpose are required. Most programs also require an interview with program faculty. The interview may be waived with permission of the lead faculty of the desired program for those living outside the Washington metropolitan area.

In addition to these basic requirements, individual programs may require relevant professional experience and other supporting documentation before a final decision on admission is made. Upon receipt of the application to the individual program, information on specific requirements will be sent to the applicant. The personal interview, professional experience, and

supporting references provide important qualitative evidence concerning an applicant's academic potential and professional background.

The admission review is based upon a comparison of qualifications among all applicants, weighing both the School's general admissions criteria and program-specific criteria.

Positive decisions are made quickly for applicants who present uniformly strong application credentials in all areas. In some cases, unusually strong factors will offset comparatively weak factors and result in an offer of admission to provisional status in the School. For a student to be admitted to full candidacy from provisional status, he or she must earn grades of *B–* or better with a minimum cumulative grade-point average of 3.0 in the first 9 credit hours of course work. Grades of *I* are not acceptable.

Advanced Standing

Advanced standing is granted for approved courses taken at other accredited institutions, but a minimum of 24 credit hours must be completed in the Graduate School of Education and Human Development as a master's candidate. A maximum of 12 credit hours taken in nondegree status may be credited toward the master's degree.

Advanced standing is not granted for work completed five or more years before application for admission or readmission to master's candidacy. All work accepted for advanced standing must have been earned with a grade of *B* or better and must be approved for acceptance by both the advisor and the dean. *Credit*, *Satisfactory*, *Audit*, or other nonletter grades are not acceptable.

Plan of Study

The plan of study leading to the degree of Master of Arts in Education and Human Development requires a minimum of 33 hours of graduate credit. All programs include Educ 295 or 298 to satisfy the research requirements. Several programs have additional credit hour requirements.

The plan may, at the student's option, include a thesis carrying 6 hours of graduate credit.

Programs are initially reviewed in conference with an admissions advisor in the School and subsequently finalized with a designated advisor in the candidate's area of specialization.

Programs are based on a candidate's interests and background; those related to teaching in public schools are designed around certification requirements of the state and locality in which the candidate plans to teach.

All degree requirements must be completed within six years, whether study is full time or part time. An additional (or seventh) year is allowed in the case of a student who breaks enrollment and is subsequently readmitted.

Thesis Option

Students may elect a thesis option. The choice of the thesis subject must be approved in writing by the student's advisor and filed in the office of the dean. All theses must be submitted electronically and meet the formatting and other requirements set forth on line at www.gwu.edu/~etds. Payment of tuition for the thesis course entitles the candidate, during the period of registration, to the advice and direction of the member of the faculty under whom the thesis is to be written. In case a thesis is unfinished, additional time may be granted. The student must, however, be enrolled continuously in the program. If the preparation of the thesis extends beyond the additional time granted, the student must register for the entire 6 hours of thesis again and pay tuition as for a repeated course.

Master's Comprehensive Examination

Candidates in master's programs requiring 33 credit hours must take a comprehensive examination. Candidates in some nonteaching programs whose basic requirements exceed 36 credit hours may waive the comprehensive examination with approval of the academic advisor.

Candidates who plan to take the examination must file a written application in the Dean's Office of the Graduate School of Education and Human Development by the announced deadline.

Comprehensive examinations are required of students in educational leadership and administration, international education, education technology leadership, and all programs in the Department of Teacher Preparation and Special Education. See Continuous Enrollment and Maintaining Residence, above.

Second Master's Degree

Persons seeking a second master's degree in the Graduate School of Education and Human Development must complete all core and specialization requirements and a minimum residency requirement of 24 credit hours.

The Degree of Education Specialist

The program of advanced study leading to the degree of Education Specialist is for students with master's degrees in education who seek further professional preparation for specific objectives.

The program is available in the fields of educational leadership and administration, counseling, curriculum and instruction, higher education administration, human and organizational learning, and special education.

Admissions Requirements

The following are required for entrance to an Education Specialist program: a Master of Arts in Education and Human Development or its equivalent, two years of pertinent experience in an education or human development field, and a graduate scholastic average of at least 3.3 and an acceptable score on either the Graduate Record Examination or Miller Analogies Test. In the field of human and organizational learning, the Graduate Management Admission Test is acceptable as well. Two letters of recommendation, one from a professional supervisor and one

from the most recent graduate faculty advisor, are required, along with a statement of professional goals. Each applicant must be interviewed and recommended by a faculty advisor in the major field.

Programs of Study and Degree Requirements

Individual programs are developed, through a plan of study worked out with a faculty advisor, to fit the candidate's skills, interests, and career goals. A minimum of 30 credit hours beyond the requirements of the degree of Master of Arts in Education and Human Development is required. At least 21 hours of this work must be taken in residence at GW. A maximum of five calendar years is allowed for completion of the program.

At least 12 of the required 30 hours must be in appropriate graduate courses in education selected from the following areas: (1) foundations and cognate study, (2) background and general principles of the field of study, and (3) an area of specialization. A graduate-level research methods course must be included in the program if it was not completed in previous graduate work.

The Comprehensive Examination

Successful completion of a six-hour written examination and/or an oral examination, at the option of the major field advisor, is required. Candidates taking the examination must be registered for at least 1 credit hour in the semester it is to be taken and must file a written application in the dean's office by the published deadline.

The Degree of Doctor of Education

The Graduate School of Education and Human Development offers programs of advanced study leading to the degree of Doctor of Education. These programs provide major fields of study in curriculum and instruction, special education, educational administration and policy studies,

human and organizational learning, and higher education administration. Supporting fields are available in educational administration, higher education administration, counseling, curriculum and instruction, education policy, elementary education, human development, human and organizational learning, international education, program evaluation, secondary education, special education, supervision, and teacher education. With the approval of a student's program planning committee, course work may be taken in other departments of the University and through the Consortium. All programs require study of interrelated areas of education and a doctoral dissertation in the major field of study.

All doctoral programs are designed to accommodate the needs of working professionals who must pursue their studies on a part-time basis. Required graduate courses, with few exceptions, are offered in the late afternoon and evening. In some programs, selected courses may be taken at off-campus locations.

Admission Requirements

The applicant must have adequate preparation for advanced study, including an undergraduate degree and graduate work from an accredited institution in fields prerequisite to his or her objective and comparable to that required for the degree of Master of Arts in Education and Human Development at this University. Students with a master's degree in a field other than education may be considered for doctoral study provided that the degree and previous experience are judged relevant by the major field program faculty.

For an application to be considered by the major field program faculty, an applicant must have a minimum graduate scholastic average of 3.3 on a scale of 4.0 and an acceptable score on the Miller Analogies Test or Graduate Record Examination. In the field of human and organizational learning, the Graduate Management Admission Test is acceptable as well.

Programs often set higher admission standards, and the number of new doctoral students in each program is limited.

The applicant is strongly encouraged to schedule an interview with the director of graduate admissions, who will discuss the applicant's needs in relation to the School's resources, explain the required procedures and standards, and guide the applicant through the admission process. In addition, all applicants must have an interview with faculty members in the major field. Students receiving favorable recommendations from the major field faculty are admitted to precandidacy for the degree.

Precandidacy and Candidacy

The Doctor of Education program is divided into two stages: precandidacy and candidacy. In general, the degree program requires three or more years of full-time study beyond the master's degree or the equivalent in part-time study. Course work and the comprehensive examination must be completed within five years, and the entire program must be completed within eight years. The minimum residency requirement in degree status for the Ed.D. is 36 credit hours of course work in the precandidacy stage and 12 to 24 credit hours of dissertation research in the candidacy stage. In most cases, course work beyond the minimum is required.

In the precandidacy stage, all course work in the program must be completed and the comprehensive examination passed. Course work toward the doctorate is established on the basis of a framework of seven domains: knowledge of foundations; critical literature review; research methods; clarity of thought, as expressed both in speech and in writing; professional development; technological skills; and depth of knowledge of the specialty area. A program plan of study is developed between the doctoral student and a doctoral study advising team, generally consisting of two members of the program faculty.

The comprehensive examination is generally a two-day examination held each semester and taken upon completion of all course work (Pre-Dissertation Seminar may be excepted). Students taking the examination must be registered for at least 1 credit hour in the semester it is to be taken and must file a written application in the dean's office by the announced deadline. Programs may have specific comprehensive exam requirements.

The candidacy stage of doctoral study begins after successful completion of the comprehensive examination. A doctoral research dissertation committee is established and the candidate develops a dissertation proposal (this may be while registered in Pre-Dissertation Seminar). Upon successful completion of the comprehensive examination and the Dissertation Seminar, students must register for a minimum of 3 hours of Dissertation Research each fall and spring semester, until the satisfactory completion of the dissertation or the completion of 24 credit hours of dissertation research. Once they have reached their 24 credit hour maximum, they must register each subsequent fall and spring semester for 1 credit hour of Continuing Research until completion of their degree program with the successful defense of the dissertation to the Dissertation Oral Examination Committee. The accepted dissertation is submitted electronically, with a processing fee paid directly to Proquest/UMI.

Detailed information on the Ed.D. program and its administration is available in the GSEHD Doctoral Student Handbook. Students completing their degree program should refer to the section on Graduation Requirements, Participation in the Commencement Ceremony, under University Regulations.

The Ed.D. in the field of Human and Organizational Learning (Executive Leadership Program)—The program provides a forum through which students, their organizations, and the University can build a partnership to develop leadership in the field of human and organizational

learning and bring about significant change within the cooperating organizations. In addition to the general requirements for admission to the Ed.D., applicants must have at least three years of full-time experience in a field related to human and organizational learning. Conducted in a cohort format, the program focuses on leadership, change, research, and learning. Class sessions are held one weekend a month for two years. The program is completed by the research, writing, and defense of the dissertation.

The Degree of Doctor of Philosophy in the Field of Counseling

A Ph.D. in the field of counseling is offered through Columbian College of Arts and Sciences in collaboration with the Graduate School of Education and Human Development.

Graduate Certificate Programs

The Graduate School of Education and Human Development offers the following graduate certificate programs. Note that Counseling and School Counseling are post-master's certificate programs.

Bilingual Special Education (18 credits)

Brain Injury: Educational and Transition Services (15 credits)

Counseling (12 credits)

Counseling Culturally and Linguistically Diverse Persons (12 credits)

Educational Leadership and Administration (18 credits)

E-Learning (15 credits)

Instructional Design (15 credits)

Integrating Technology into Education (15 credits)

Job Development and Placement (12 credits)

Leadership Development (18 credits)

Leadership in Educational Technology (15 credits)

Multimedia Development (15 credits)

Professional Teaching Standards (15 credits)

Reading and Literacy (15 credits)

School Counseling (12 credits)

Teaching Students with Emotional and Behavioral Disabilities (18 credits)

Training and Educational Technology (15 credits)

Transition Special Education (12 credits)

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SCHOOL OF ENGINEERING AND APPLIED SCIENCE

Dean D.S. Dolling

Associate Dean M. Pardavi-Horvath

The School of Engineering and Applied Science was organized in 1884 as the Corcoran Scientific School of Columbian University, named in honor of William W. Corcoran, president of the University's Board of Trustees from 1869 to 1888. The school was among the first to accept women for degree candidacy in engineering. While the organization and offerings of the school have evolved over the years, through most of its history its programs have been characterized by an emphasis on the principles guiding the advancement of technology.

Through its five departments—Civil and Environmental Engineering, Computer Science, Electrical and Computer Engineering, Engineering Management and Systems Engineering, and Mechanical and Aerospace Engineering—the School of Engineering and Applied Science offers graduate study leading to the degrees of Master of Science and Doctor of Philosophy and to the two professional degrees of Engineer and Applied Scientist. Programs are individually planned

according to the student's preparation and needs. The School also offers many graduate-level certificate programs through its departments.

Research centers and institutes offer opportunities for student and faculty research, strengthening ties with counterparts in government and industry, and contributing to the development and harnessing of emerging technology. These include Aviation, Biomedical Engineering, Biomimetics and Bioinspired Engineering, Computer Graphics, Intelligent Systems Research, Massively Parallel Applications and Computer Technologies, National Crash Analysis, Cyber Security Policy and Research, MEMS and VLSI Technologies, Magnetics Research, Materials Science, Knowledge and Innovation, and Crisis, Disaster, and Risk Management.

Degree Programs

The following list shows the eight fields of graduate study and representative areas of focus. Degree requirements are presented in subsequent pages. Within some fields, students may choose to focus their course work in other specialties as well. For information on professional and doctoral degrees in a given field, contact the department administering the field.

Civil and Environmental Engineering—engineering mechanics; environmental engineering; geotechnical engineering; structural engineering; transportation safety engineering; water resources engineering

Computer Engineering—computer architecture and networking; microelectronics and VLSI systems; multimedia processing and networks

Computer Science—algorithms and theory; bioinformatics; biomedical computing; computer architecture and networks; computer security and information assurance; database and information systems; machine intelligence and cognitive science; multimedia, animation,

graphics, and user interface; parallel and distributed processing; software engineering and operating systems

Electrical Engineering—biomedical engineering; communications and networks; electromagnetics; signal processing, systems, and controls

Engineering Management—crisis, emergency, and risk management; economics, finance, and cost engineering; engineering and technology management; environmental and energy management; knowledge and information management; software engineering and information security.

Mechanical and Aerospace Engineering—aerospace engineering; design of mechanical engineering systems; fluid mechanics, thermal sciences, and energy; industrial engineering; solid mechanics and materials science; structures and dynamics

Systems Engineering—operations research and management science; systems engineering and integration

Telecommunications and Computers (M.S. only)—telecommunications networks; telecommunications network security

Admission Requirements

Entrance requirements are outlined under individual degree programs, below.

Transfer of Credit

With the approval of the student's advisor and department chair, graduate credit may be transferred, when applicable, to meet degree requirements of the School. For a master's or professional degree candidate, or a doctoral candidate whose highest earned degree is a master's, up to 6 credit hours may be transferred. For a doctoral candidate whose highest earned degree is a bachelor's degree, up to 24 credit hours may be transferred from another doctoral program. The

credit must have been completed with grades of *A* or *B* at another accredited and recognized institution, at a level of study equivalent to that being pursued at GW. The professional and doctoral degree programs require that the credit be earned no more than five years prior to admission to the GW program, and some departments require that it be earned more recently. Credit applied toward a previous degree may not be transferred. Transfer of credit regulations apply to courses taken as a nondegree student through GW's Office of University Students; that is, up to 6 credit hours may be taken in nondegree status before applying for admission to degree status. For purposes of transfer of credit, SEAS graduate certificate programs are not considered prior degrees; at the discretion of the department concerned, the credit hours earned in a SEAS certificate program may be applied to a subsequent master's degree program.

English Language Requirements for Admission of International Students

Applicants from countries where English is not an official language must take the Test of English as a Foreign Language (TOEFL) or the academic International English Language Testing System (IELTS). The University looks for a minimum score of 550 (paper-based) or 213 (computer-based) or 80 (Internet-based) on the TOEFL, or an overall band score of 6.0 on the academic IELTS with no individual band score below 5.0, in considering candidates for admission. Those admitted as degree candidates must take the GW English for Academic Purposes Placement Test. Only those students who score 600 (paper-based) or 250 (computer-based) or 100 (Internet-based) or higher on the TOEFL, or an overall band score of 7.0 on the academic IELTS with no individual band score below 6.0, will be exempted from this requirement.

Depending on the test results, the student may be restricted in the number and type of courses that can be taken. Students assigned English for Academic Purposes courses should anticipate

additional related tuition expenses as well as possible extended periods of time required to complete their degree programs. Departments may set higher standards and should be consulted.

An applicant whose documented English language skills on the TOEFL or the academic IELTS do not meet the minimum standards required to pursue graduate study at GW, but whose academic background and preparation are otherwise appropriate for admission to SEAS, may be offered conditional admission and referred to the Bridge program that has been arranged with the English as a Foreign Language program at Georgetown University. This program allows an applicant to concentrate on English language skills in the EFL program at Georgetown University until an acceptable TOEFL or academic IELTS score is demonstrated, whereupon full admission to SEAS is offered. More information is available from the associate dean of SEAS.

SEAS Regulations

Grades

Information on grades and computing the grade-point average is found under University Regulations.

At the option of the instructor, the notation of *I* (Incomplete) may be recorded if a student, for reasons beyond his or her control, is unable to complete the work of the course and if the instructor is informed of and approves such reasons before the date when grades must be reported. The *I* may be used only if the student's prior performance and class attendance in the course have been satisfactory. Any failure to complete the work of a course that is not satisfactorily explained to the instructor before the date when grades must be turned in will be graded *F*. If acceptable reasons are later presented, the instructor may initiate an appropriate grade change. Although the *I* may remain on the record for a maximum of one year, the instructor should normally set a much briefer period within which the uncompleted work must be

made up. The *I* cannot be removed by the student's reregistering for the course here or taking its equivalent elsewhere. An incomplete that is not removed within one calendar year or at the time of graduation of the student, whichever occurs first, is automatically changed to an *IF*. When the *I* is changed to a letter grade, the *I* followed by the letter grade (e.g., *IB*) will appear on the student's record.

Credit/No Credit Grading System—SEAS students may take SEAS courses under the credit/no credit grading system, but credit for such courses cannot be applied toward any degree program in SEAS.

Program of Study

In consultation with the academic advisor, each student develops a program of study and enters it on a form that governs the student's degree requirements and that must be approved by the advisor and department chair. The form should be established soon after matriculation and must be completed before the student is certified for graduation.

Residence and Continuous Enrollment

All work for the degree must be done in residence unless an exception is granted by the department chair. A student in a degree program is expected to be continuously enrolled in the School until the degree is conferred. A student who breaks his or her registration must apply for readmission to the degree program under whatever conditions and regulations are in force at that time. To maintain continuous enrollment, a student may register in one of the following categories.

Leave of Absence—This status is available to students who are attending classes at another institution (special approval is required); who are temporarily transferred out of the area (e.g., for military TDY); or who are having temporary medical problems.

Continuing Research—Students who have completed their research credits, but are not yet ready to defend a thesis or dissertation, must register for 1 credit of Continuing Research each semester as appropriate.

Examination Preparation—Students who are studying for a comprehensive or qualifying exam for the current or following semester, and are not taking any courses, must register for 1 credit of Examination Preparation as appropriate.

Master of Science Degree Program

Entrance Requirements

Admission to the Master of Science degree program requires an appropriate bachelor's degree from a recognized institution and evidence of capacity for productive work in the field selected, such as may be indicated by undergraduate grades, GRE scores, and similar data. Although GRE scores are not generally required for admission to SEAS, applicants are encouraged to take the examination. In general, a grade average of *B* (3.0 on a scale of 4.0) in the last 60 hours of undergraduate course work is required. Department-specific requirements are indicated below.

Scholarship Requirements

Courses specified in a student's program of study must be completed with a minimum grade-point average of 3.0 for award of a master's degree. Courses specified upon admission as deficiency or prerequisite courses do not form part of the program of study. A student who receives two grades of *F* or three grades below *B–* is barred from further enrollment in graduate courses and, ordinarily, will not be readmitted as a degree candidate. A student may not repeat for credit a course in which he or she has received a grade of *C–* or above, unless required to do so by the department chair. A written statement requiring the student to repeat such a course for credit must be submitted to the registrar by the department chair.

Time Limits

A full-time student in the master's program is allowed a maximum of three calendar years (excluding any time spent taking only English for Academic Purposes courses) to complete all degree requirements, from the date of first registration as a degree candidate in prerequisite or graduate courses. A part-time student in the master's program is allowed a maximum of five calendar years. The time limit does not include any period of registration as an unclassified student before admission to degree candidate status or any period spent on approved leave of absence. Students who do not complete degree requirements within the allowed time will have their degree candidate status terminated. They may be readmitted to degree candidate status under conditions specified by the department chair and approved by the dean.

Master's Thesis

The master's thesis must demonstrate the student's ability to make independent use of the knowledge and discipline of thought acquired through graduate study, to undertake constructive work in a given field, and to communicate the results of the work in writing. Suitable work for which the student has professional responsibility may be considered, whether done on or off campus, provided no significant amount of work is completed without faculty supervision. An accepted thesis is the property of the University.

To register for the thesis course sequence (299–300), the candidate must submit the thesis area to the appropriate department chair, on the form obtained from the department office and approved by the faculty advisor. At the beginning of the semester of expected graduation, the candidate must submit the thesis title to the dean, on the form available in the department office. While registered in the thesis course sequence, the student is entitled to the advice of the faculty member under whom the thesis is to be written. Students may consult with their advisors, but

they have primary responsibility for the thesis. Students orally defend their thesis before a committee of School faculty.

The thesis in final form must be submitted by the stated deadline. In the event a thesis is unfinished on the date specified, the student must register for continuing research. The overall time limit for earning the degree (see Time Limits, above) may not be exceeded. All theses must be submitted electronically and meet the formatting and other requirements set forth on line at www.gwu.edu/~etds.

Fields of Study

Graduate programs in the School of Engineering and Applied Science are available in eight fields of study, indicated under the offering department, below. Each field in turn encompasses several areas of focus. The course of study responds to the unique interests of the student, who designs an individual program in close consultation with the assigned advisor. In most areas, students follow a prescribed core and elect approved courses from within the School of Engineering and Applied Science and from other schools of the University. Because engineering expertise includes a broad foundation in technology, engineering study may profitably be combined with study in other areas to sharpen the engineer's focus in practice. Students must satisfy, through undergraduate studies or otherwise, either the prerequisites specified for the desired field or approved equivalents.

Department of Civil and Environmental Engineering

The Department of Civil and Environmental Engineering administers the field of civil and environmental engineering. In addition to the entrance requirements stated above, the applicant is expected to have an undergraduate degree in engineering, the physical sciences, or applied

mathematics. Minimum requirements for the degree are 33 credits of course work or 24 credits of course work and 6 credits of thesis.

Representative Areas of Focus Leading to the Master of Science

Engineering Mechanics—Required: ApSc 213; CE 220, 227.

Environmental Engineering—Required: CE 242, 250, 258.

Geotechnical Engineering—Required: CE 227, 231, 254.

Structural Engineering—Required: CE 205, 210, 227.

Transportation Safety Engineering—Required: CE 227, 260, and 202 or 273.

Water Resources Engineering—Required: CE 242, 250, 258.

Department of Computer Science

The Department of Computer Science administers the field of computer science. Both thesis and non-thesis options are available. In addition to the entrance requirements stated above, students are expected to be adequately prepared in the basic physical sciences and in mathematics (one year each of university laboratory science and of math beyond precalculus), and have taken a course in computer programming using a structured language and CSci 123, 133, and 135 or their equivalents.

The program of study must have a minimum of 30 credit hours, of which at least 24 credits must be at the 200 level or above. CSci 210, 211, 212 are required. The following undergraduate courses may be taken for graduate credit if they are included in the student's approved program of study: CSci 144, 166, 168, 173, 174, 175, 185, 187, 188, 189, 190, 191, 193, and 194.

Normally, no more than two courses may be taken outside of those offered by the department.

Graduate students are required to attend several department colloquia each semester. These are intended to broaden the student's professional outlook and to encourage interaction with the faculty. Schedules are posted.

Representative Areas of Focus Leading to the Master of Science

Algorithms and Theory

Bioinformatics

Biomedical Computing

Computer Architecture and Networks

Computer Security and Information Assurance

Database and Information Systems

Machine Intelligence and Cognitive Science

Multimedia, Animation, Graphics, and User Interface

Parallel and Distributed Processing

Software Engineering and Operating Systems

Department of Electrical and Computer Engineering

The Department of Electrical and Computer Engineering administers the fields of computer engineering, electrical engineering, and telecommunications and computers. Both thesis and non-thesis options are available. In addition to the entrance requirements for the degree listed above, students are required to have a bachelor's degree in electrical engineering, computer engineering, or computer science and be adequately prepared in the basic physical sciences and in mathematics. Students with a bachelor's degree in another field and a basic knowledge of (a)

mathematics and (b) electrical engineering, computer engineering, or computer science may be admitted, with a set of deficiency courses to be determined by the student's advisor.

The student is required to take three of the following eight courses: ECE 201, 203, 210, 211, 219, 225, 248, and 280. The student chooses additional courses (five courses in the thesis option, or seven courses in the non-thesis option) based on individual interests, subject to the approval of the student's faculty advisor. Normally, no more than two courses may be taken outside of those offered by the department. A maximum of three ECE courses at the 100 level may be counted toward the requirements for the degree, provided that an indication of "May be taken for graduate credit" is in the course description found in the Undergraduate Programs Bulletin. Every ECE graduate degree student must register for the 0-credit colloquium course ECE 390. Students satisfy the requirements for this course by attending five colloquium seminars, workshops, or symposia sponsored by the Department of Electrical and Computer Engineering.

Computer Engineering—Areas of focus leading to the Master of Science degree include computer architecture and networking, microelectronics and VLSI systems, and multimedia processing and networks.

Electrical Engineering—Areas of focus leading to the Master of Science degree include biomedical engineering; communications and networks; electromagnetics; and signal processing, systems, and controls.

Telecommunications and Computers—Areas of focus leading to the Master of Science degree include telecommunications and networks and telecommunications network security.

Department of Engineering Management and Systems Engineering

The Department of Engineering Management and Systems Engineering administers the field of engineering management and the field of systems engineering. Both thesis and non-thesis options are available.

A grade of *C* or better in Math 32 or its equivalent is prerequisite to all graduate programs offered by the Department. The Department requires that the applicant have a suitable bachelor's degree in an area such as engineering, a physical science, or mathematics from a recognized university with a *B* or better average for the last two years of undergraduate study. Applicants with different academic backgrounds may be considered for admission; additional course work or other requirements may be a condition of admission in such cases.

A minimum of 36 credit hours is required, including EMSE 212, 260, 269, and 283 as the core courses in the Department. Each area of focus has specified course requirements, with electives as part of the program.

Engineering Management—Representative areas of focus leading to the Master of Science degree include crisis, emergency, and risk management; economics, finance, and cost engineering; engineering and technology management; environmental and energy management; knowledge and information management; software engineering and information security.

Systems Engineering—Representative areas of focus leading to the Master of Science degree include operations research and management science; systems engineering and integration.

Department of Mechanical and Aerospace Engineering

The Department of Mechanical and Aerospace Engineering administers the field of mechanical and aerospace engineering. In addition to the entrance requirements stated above, the applicant is expected to have a background that includes an undergraduate degree in engineering, the

physical sciences, or applied mathematics. The minimum program consists of 33 credit hours of course work or 24 credit hours of course work plus a master's thesis (6 credits). Some areas of mechanical and aerospace engineering leading to the Master of Science are offered at the NASA–Langley Research Center in Hampton, Virginia. NASA–Langley's extensive scientific and engineering facilities are used whenever possible.

Representative Areas of Focus Leading to the Master of Science

Aerospace Engineering—Required: ApSc 212 or 213 and MAE 286; one course chosen from MAE 207, 221, or 276. Students may focus their course work on aeroacoustics, aeronautics, astronautics, propulsion, or space systems.

Design of Mechanical Engineering Systems—Required: MAE 243, 251, 286. Students may focus their course work on computer-aided design, computer-integrated design and manufacturing, mechanical engineering design, and robotics.

Fluid Mechanics, Thermal Sciences, and Energy—Required: ApSc 213; MAE 221, 286.

Industrial Engineering—Prerequisite: Math 33, ApSc 115; CSci 49, 50, or 100. Required: EMSE 260, 282; MAE 201, 252; two approved three-course sequences, one in the Department of Mechanical and Aerospace Engineering, the other in a cooperating department in SEAS.

Solid Mechanics and Materials Science—Required: ApSc 213; MAE 210 and 231 or 235.

Structures and Dynamics—Required: ApSc 213; MAE 207, 286.

Professional Degree Program

The School of Engineering and Applied Science has established the professional degree program for those students who wish to pursue course work beyond the master's degree with emphasis on applied subject material rather than on basic research. Successful completion of the professional degree program leads to the degree of Engineer or of Applied Scientist.

Entrance Requirements

Admission to study toward the professional degree requires an appropriate master's degree from a recognized institution and evidence of capacity for productive work in the field selected as indicated by prior scholarship and, where appropriate, professional experience. The Departments of Computer Science and of Electrical and Computer Engineering require applicants for the professional degree to have had two years of professional experience after receiving the master's degree.

To study toward the degree of Engineer, an applicant must have earned a bachelor's degree and a master's degree in an area of engineering.

To study toward the degree of Applied Scientist, an applicant must possess a master's degree in engineering, computer science, natural science, or mathematics. Applicants who have an equivalent quantitative background may be considered as special cases by the respective departments.

Normally, a *B* average in graduate work is required, although the departments often set higher admission standards. Some programs have specified prerequisites. An applicant who has significant deficiencies in preparation may be required to take prescribed prerequisite courses, which do not count toward any part of the requirements for the professional degree.

Program Requirements

The minimum program consists of 30 credit hours of approved graduate courses beyond a master's degree. Students whose graduate study does not include necessary prerequisites may be required to take additional course work.

Programs are determined by established prerequisites and the requirements of the department in which the student wishes to study. The program of each professional degree candidate must be approved by the student's advisor and the department chair.

Each department may require its degree candidates to undertake and defend the results of a technical design project or a development problem or to prepare a comprehensive technical report to demonstrate the candidate's ability to make independent use of the knowledge and discipline of thought acquired through graduate study. When applicable, the student will be informed of this requirement by the faculty advisor at the time the student's program is being formulated. The project may not be more than 6 credit hours out of the minimum 30.

Scholarship Requirements—If a student studying for the professional degree receives two grades of *F* or three grades below *B–*, study is terminated and further enrollment prohibited. A student must have a final grade-point average of 3.0 to receive the degree. The Department of Engineering Management and Systems Engineering requires a final grade-point average of at least 3.4.

Time Limits—A full-time student in the professional degree program is allowed a maximum of three calendar years to complete all degree requirements, from the date of first registration as a degree candidate in prerequisite or graduate courses. A part-time student in this program is allowed a maximum of five calendar years. The time limit does not include any period of registration as an unclassified student before admission to degree candidate status or any period spent on approved leave of absence. Students who do not complete degree requirements within the allowed time will have their degree candidate status terminated. They may be readmitted to degree candidate status under conditions specified by the department chair.

Relationship with the Doctoral Program—Candidates for the Doctor of Philosophy degree or professional degree who are in good academic standing may, with the approval of the faculty advisor and department chair, transfer from one degree program to the other within their department if they meet the qualifications and requirements specified by the department. In the Department of Engineering Management and Systems Engineering, only one such transfer is permitted.

Doctor of Philosophy Degree Program

The doctoral program is designed to prepare the student for a career of creative scholarship by providing a broad but balanced background of knowledge and guidance in the performance of research. The program is divided into two stages. The first comprises a study of related fields of learning that support the general area of research concentration and culminates in the qualifying examination. The second, composed of original research and the presentation of findings in a written dissertation, culminates in the final examination.

Entrance Requirements

Admission to the Doctor of Philosophy degree program requires an appropriate earned baccalaureate or master's degree from a recognized institution, completed course work designated by the department as pertinent to the field to be studied, an acceptable professional background, and a capacity for creative scholarship. All applicants must submit scores from the Graduate Record Examination general test. Students whose highest earned degree is a baccalaureate must present a grade-point average of at least 3.3 on a scale of 4.0 in undergraduate work. For students whose highest earned degree is a master's degree,

departmental requirements for the grade-point average in course work leading to that degree are as follows (on a scale of 4.0): Civil and Environmental Engineering, Electrical and Computer Engineering, and Mechanical and Aerospace Engineering, 3.4; Computer Science, and Engineering Management and Systems Engineering, 3.5. Consult the department concerned for field-specific admission requirements.

Program Requirements

Upon admission to the first stage of the program (that is, study of related fields culminating in the qualifying examination), the student is assigned a faculty advisor who directs his or her studies. In some departments a faculty committee may be appointed instead of a single advisor. Programs of study are structured to include a major field and two minor or supporting fields. Check with the department concerned for requirements.

A minimum of 30 credit hours in a formal program at the graduate level beyond master's study or, for students without master's degrees, a minimum of 54 credit hours in a formal program at the graduate level beyond the baccalaureate, is required. In many cases, particularly when the student undertakes a doctoral program in a field other than that in which the earlier degree was obtained, the program of study exceeds the minimum number of credit hours. Consult the department concerned for specific curriculum requirements. In addition, all doctoral students take a minimum of 24 hours of dissertation research.

Departments may establish a tool requirement, such as an examination in a computer language.

The Department of Computer Science requires a preliminary examination that must be passed within four semesters of starting the program. It comprises core material from CSci 210, 211, and 212 but is not limited to these courses.

The Department of Electrical and Computer Engineering requires a preliminary examination that must be taken before completing 18 credits after initial registration. The examination is guided by but not limited to the core material of the master's program. Specific details regarding the structure of the exam are available in the department.

Students admitted to doctoral study are encouraged to undertake one year of full-time study on campus. In general, the advisor will require the student to register for a minimum of 6 credit hours of course work in every fall and spring semester.

To be admitted to the qualifying examination, the student must have an overall grade-point average of 3.2. The Department of Mechanical and Aerospace Engineering and the Department of Engineering Management and Systems Engineering require a cumulative grade-point average of at least 3.4.

If a doctoral student receives two grades of *F* or three grades below *B–*, graduate study is terminated and further enrollment prohibited. Courses in which the student earns grades below *B–* are not included in the total credit-hour requirement for the degree. Students who receive any grade below *B–* are required to review their programs of study with their advisors.

The Qualifying Examination

The qualifying examination is the principal means of determining whether a student will qualify as a candidate for the doctoral degree and progress to the second stage of the program. Its purpose is to ascertain that the student's background and intellectual development are adequate to support doctoral research in the central field. (Some departments may administer a prequalifying examination prior to completion of the study program.)

Qualifying examinations may be written or oral or both. They are conducted on dates established by the departments and are administered by a faculty committee. Upon favorable

report of the examiners to the dean through the department chair, the student is admitted to candidacy for the degree; the student then begins specialized study and research under the supervision of a designated member of the full-time faculty.

At the discretion of the committee that prepared the examination, a student who fails any part of the qualifying examination may be given a second opportunity to qualify for candidacy. Usually, the entire examination must be retaken.

Students who fail to qualify for candidacy in a doctoral program of the School will be considered to have failed on a school-wide basis and will not be admitted to further doctoral study within the School.

Dissertation and Final Examination

The student admitted to candidacy for the degree of Doctor of Philosophy chooses the faculty member under whom he or she wishes to conduct research; the faculty member may accept or reject the request to serve as the student's director of research. The research area is approved by the director, and throughout the remainder of the doctoral program the candidate conducts dissertation research under the director. However, the student may consult other members of the faculty on an informal basis. In the Department of Engineering Management and Systems Engineering, students are required to present a written dissertation proposal to a committee of three full-time faculty members and to successfully defend the proposal in an oral defense subsequent to performing the bulk of their dissertation research. Work on the dissertation encompasses a minimum of 24 credit hours.

The Dissertation—A dissertation is required as evidence of ability to perform original scholarly research and to present and interpret the results. The student is solely responsible for the content of the dissertation.

The dissertation should embody the results of an extended original study and include material deemed worthy of publication in recognized scientific and engineering journals. The student is expected to attempt to have the results of the research published as soon as possible after he or she receives the degree and to submit copies of the published material to the dean. The Departments of Computer Science and of Engineering Management and Systems Engineering require submission of a conference paper or an article to a refereed journal prior to completion of degree requirements. The Department of Electrical and Computer Engineering requires the submission of a paper to a refereed journal and its acceptance for publication prior to the completion of degree requirements. Credit must be given in the publication to the fact that the material is abstracted, summarized, or developed from a dissertation submitted to The George Washington University in partial fulfillment of the requirements for the Doctor of Philosophy degree.

The candidate must submit electronically the approved dissertation and an abstract. Detailed regulations regarding the form of the dissertation and preparation of the abstract are available in department offices. Accepted dissertations are submitted electronically, with a processing fee paid directly to Proquest/UMI. The dissertation, with accompanying files, becomes the property of the University.

The Final Examination—Upon acceptance of the dissertation by the research committee, the candidate is presented for the final examination. The final examination is oral and is open to the public. The candidate must demonstrate a mastery of the special field of study and of the materials and techniques used in the research. The committee of examiners may include qualified experts brought to the University especially to participate in the examination. The director of research usually serves as advocate for the candidate. Students should consult department

regulations concerning the formation of the committee. When the examining committee is convinced of the quality and originality of the candidate's contribution to knowledge as well as his or her mastery of the scholarship and research techniques of the field, the committee recommends the candidate for the degree of Doctor of Philosophy. The candidate should consult the department chair about scheduling the examination.

Students completing their degree program should refer to the section on Graduation Requirements, Participation in the Commencement Ceremony, under University Regulations.

Enrollment Requirements

Full-time doctoral students must register for a minimum of 9 credits per semester until 24 credits of Dissertation Research have been completed, and 1 credit of Continuing Research each semester thereafter until satisfactory completion of the final examination. Part-time doctoral students must normally register for a minimum of 6 credits per semester until 24 credits of Dissertation Research have been completed and 1 credit of Continuing Research each semester thereafter until satisfactory completion of the final examination. No minimum load is required during the summer sessions.

Time Limits

In general, one year of study is the minimum amount of time to be spent in preparation for the qualifying examination, although the student may apply for the examination whenever he or she feels properly prepared. The qualifying examination must be completed within five years of the date of admission, and the entire degree program must be completed within seven years unless an extension is granted by the department. Approval of an extension is conditional on satisfactory progress. The time period for completion of the degree may be adjusted by the department for an approved leave of absence. A minimum of two years of full-time study and research should be

expected in meeting the requirements for the degree. All time periods indicated here are increased by two years for a student entering the doctoral program without a master's degree.

Graduate Certificate Programs

The School of Engineering and Applied Science offers graduate certificate programs in several fields. At the discretion of the respective departments, credit earned in the certificate program can be applied to a subsequent master's degree program. Details are available in the Office of the Dean. Certificate programs include the following:

Computer Architecture and Networking (15 credits)

Computer-Integrated Design in Mechanical and Aerospace Engineering (12 credits)

Computer Security and Information Assurance (12 credits)

Emergency Management and Public Health (18 credits)

Engineering and Technology Management (18 credits)

Homeland Security Emergency Preparedness and Response (18 credits)

Knowledge and Information Management (18 credits)

Optical Communications and Networks (15 credits)

Systems Engineering (18 credits)

Telecommunications Networks (12 credits)

Telecommunications Security and Electronic Warfare (15 credits)

Wireless and Mobile Networks (18 credits)

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ELLIOTT SCHOOL OF INTERNATIONAL AFFAIRS

Dean M.E. Brown

Associate Deans H.L. Agnew, D.A. Grier, D. Shaw

Assistant Dean L. Stephenson

The Elliott School of International Affairs offers graduate and undergraduate programs to prepare individuals for understanding and working in an increasingly globalized world. The historical roots of the Elliott School extend back to the establishment of the School of Comparative Jurisprudence and Diplomacy in 1898. In 1966, the School separated from the School of Government, Business, and International Affairs to become an independent unit, the School of Public and International Affairs. In 1987, the name was changed to the School of International Affairs, and in 1988 the School was renamed in honor of Evelyn E. and Lloyd H. Elliott. Lloyd Elliott was the president of The George Washington University from 1965 to 1988.

Master's Degree Programs

The Elliott School offers the Master of Arts in the fields of international affairs, Asian studies, European and Eurasian studies, global communication, international development studies, international science and technology policy, international trade and investment policy, Latin American and hemispheric studies, Middle East studies, and security policy studies; the Master of International Policy and Practice degree for mid-career professionals; and the Master of International Studies degree for students enrolled in master's degree programs at international universities with which the Elliott School has a special partnership.

These programs provide advanced academic and professional training in international affairs as preparation for employment in public, private, and nonprofit sectors. Focusing on major historical and contemporary issues in international affairs, the programs are both interdisciplinary and multidisciplinary, combining courses offered through the School with courses offered by other schools and departments of the University.

Admission Requirements

Admission to master's programs in the Elliott School is highly competitive. To be considered for admission, applicants must present a bachelor's degree from an accredited college or university. Scores on the general test of the Graduate Record Examination are required for Master of Arts applicants and encouraged but not required for Master of International Policy and Practice applicants. In addition, the applicant's motivation, professional experience, and academic preparation in economics and foreign language study will be considered in the selection process. Eight years of professional experience are generally required of Master of International Policy and Practice applicants.

*The following additional requirements pertain to all applicants whose native language is not English and who have not graduated from a college or university in which English is the language of instruction—*Applicants are required to submit scores from the Test of English as a Foreign Language (TOEFL) or the academic International English Language Testing System (IELTS). To be considered for admission, applicants are normally expected to have a minimum score of 600 (paper-based) or 250 (computer-based) or 100 (Internet-based) on the TOEFL, or an overall band score of 7.0 on the academic IELTS with no individual band score below 6.0. Applicants admitted as degree candidates will be required to take the GW English for Academic Purposes Placement Test before registering. (Applicants who receive a TOEFL score of 620 on the paper test or 260 on the computer test or 105 on the Internet test, or have an overall band score of 7.0 on the academic IELTS, with no individual band score below 6.5, are exempted from the placement test.) English for Academic Purposes course work may be required, depending on the applicant's performance on the placement test but may not be applied toward the degree. Students who are required to take such courses must do so at their own expense and may find that their progress toward completing the degree may be delayed.

Readmission—A graduate student who has not been continuously enrolled or on approved leave of absence must file an application for readmission the semester before planning to return to school.

Scholarship Requirements

Information on grades and computing the grade-point average is under University Regulations. Courses taken to satisfy degree requirements cannot be taken on a Credit (*CR*) basis, with the exception of Thesis Research, capstone courses, and the M.I.P.P. Practicum.

Graduate students are required to maintain a minimum cumulative grade-point average of 3.0. Students whose cumulative grade-point average falls below 3.0 at any time after having completed at least 9 credit hours will be given an additional semester in which to raise the grade-point average above 3.0. Those who fail to bring their grade-point average over 3.0 at the end of the additional semester will not be allowed to continue in the program. For part-time students and those enrolled in summer sessions, a semester is interpreted to mean a time interval in which at least 9 credit hours have accrued.

A master's candidate who receives a grade of *F* is required to present cause as to why he or she should be allowed to continue in the program of studies.

The symbol *I* (Incomplete) indicates that a satisfactory explanation has been given to the instructor for the student's failure to complete the required work of the course. When work for the course is complete, the grade earned will be indicated by the letter *I* followed by the letter grade. An Incomplete cannot be made up after the lapse of one calendar year. An Incomplete that is not made up by the end of one calendar year becomes a grade of *IF* on the student's record. An

Incomplete cannot be removed by reregistering for the course. If there are more than two Incompletes outstanding on the record, the student is not permitted to register for any courses, including the capstone course.

A student who fails to meet the established deadlines for completion of course work or other requirements of the program and is granted an extension may be required by the dean and the Dean's Council to register for 3 credit hours of graduate Reading and Research for each semester that the work is delinquent.

General Requirements for Master of Arts Degree Programs

Programs leading to the Master of Arts degree require a minimum of 40 credit hours of graduate course work and include a thesis option. Candidates for the degree of Master of Arts are required to submit an advisor-approved plan of study (fields, supporting course work, etc.) to the Academic Advising and Student Services office by the end of the first semester in residence. Master's degrees are awarded after the student has completed the required course work and an acceptable thesis (if one is elected) and has satisfied the foreign language requirement.

Students with sufficient academic background may waive a core course with approval of a designated faculty member from the department concerned. Under special circumstances, 100-level undergraduate courses may be counted toward the master's degree when registration for graduate credit has been approved at the beginning of the course by the program director, the instructor, and the dean. The student who takes an undergraduate course for graduate credit is expected, by arrangement with the instructor, to do work at the graduate level in addition to the regular work of the course. Normally, no more than 9 credits of approved undergraduate course work may be taken for credit toward a graduate degree. Academic credit counted toward a previous degree may not be counted toward the master's degree.

All master's degree candidates must complete degree requirements within five years of their admission to the program. Students who are unable temporarily to continue their studies may request a leave of absence not to exceed one year. Extensions beyond the five-year period may be granted in exceptional circumstances, but the student will be required to register and pay for 3 credits of Independent Study and Research each semester.

No more than 6 graduate credit hours may be transferred from other accredited institutions, and these may be accepted only under limited conditions of time, grades, and relevance to the student's program.

Foreign Language Requirements

In most degree programs, a candidate for the degree of Master of Arts must demonstrate reading and speaking proficiency (certified by the relevant language department) in a modern foreign language. Students in regional programs must demonstrate their ability in a language appropriate to the study of the specific region. If a student selects a language not offered by the University, a testing fee will be charged.

Each student whose native language is English must take a diagnostic exam in a foreign language during graduate student orientation. Students must also pass a reading and oral proficiency exam after successful completion of 20 hours of residence in the program. No student may take the proficiency examination more than three times. Those who fail to pass the exam in three attempts are subject to dismissal from the University. Students should consult their program guidelines for specific requirements, possible academic credit, and options concerning the language requirement.

Candidates in security policy studies may substitute advanced course work in statistics for a foreign language. Those in international science and technology policy have no foreign language

requirement; however, proficiency in a foreign language may be used to meet the program's analytical competency requirement if it can be shown to be integral to the student's program of study. Candidates in international trade and investment policy may choose to satisfy the language requirement by passing the exams administered by Language Testing International, which requires an extra fee but gives the student a proficiency rating in the language.

For all Elliott School degree programs, students who are not native speakers of English are also required to pass an English examination; this requirement is in addition to the TOEFL or IELTS required for admission. The examination, which tests high-level reading and writing proficiency, is administered by the Language Center, and should be successfully completed before the end of the candidate's second semester. This requirement is in addition to the statistics requirement in the security policy studies program and the analytical competency requirement in the international science and technology program.

Capstone Course

Every student must successfully complete a capstone course near the conclusion of the master's program. Most programs offer the capstone course once a year, during the spring semester. The student must have a 3.0 grade-point average and must have completed or registered for 30 hours before participating in the course. If there is a lapse of time between completion of other course work and the capstone course, the student must be continuously enrolled during this period. A student who fails to complete successfully the capstone course may repeat it with the permission of the dean. If the student fails a second time, no further opportunity to complete the course will be permitted and the degree will not be conferred. Details concerning the capstone course vary across programs. Students should consult their program guidelines for details.

Thesis Option

Exceptional students may write a thesis if they qualify by having a minimum 3.5 grade-point average for at least 20 hours of course work in their program and developing a formal thesis proposal approved by their prospective thesis advisor.

The thesis subject should be selected as early as possible so as to permit effective integration with the course work. A student will not be permitted to register for Thesis Research (IAff 299–300) until the thesis subject has been formally submitted to the dean’s office. Programs may set additional requirements in order to qualify to write a thesis. The subject must be approved by the member of the full-time faculty under whom the thesis is to be written, a second member of the faculty who will serve as a reader, and the student’s program director. The thesis in its final form must have the approval of the thesis director and one other reader. All theses must be submitted electronically and meet the formatting and other requirements set forth on line at www.gwu.edu/~etds.

Payment of tuition for thesis research entitles the candidate, during the period of registration, to the advice and direction of the thesis director and the other reader. In case a thesis is unfinished, the student must maintain continuous enrollment and is allowed one calendar year to complete it. If the preparation of the thesis extends beyond the additional calendar year, the student must register for the entire 6 hours of thesis again and pay tuition as for a repeated course.

Field Requirements

Asian Studies—Prerequisite: a bachelor’s degree in a related field and at least two years of study of an appropriate Asian language. Students are required to organize their course work into three fields that include skills-based courses, course work on more than one Asian country, and course work in economics, history, and political science. Students may choose a non-Asia-

related field (e.g., international business) after approval in advance by the program director. Six hours of language course credit may apply toward degree requirements.

European and Eurasian Studies—Prerequisite: a bachelor's degree in a related field, including a strong background in European history and political systems and at least two years of an appropriate European or Eurasian language. All students take a foundational colloquium, economics, a core field in European and Eurasian affairs, a second field in a professional specialization, and skills-based courses. Up to 6 hours of language study may be counted toward the degree.

Global Communication—Prerequisite: a bachelor's degree in a related field, with introductory macro- and microeconomics and at least two years of a modern foreign language. Requirements include a core field constituted of six courses of communication theory, political theory, research methods, and economics; a specialization field made up of three courses chosen from any one of the international affairs major fields; communication skills courses; and a capstone course. Up to 6 credits of language course credit may be counted toward the degree.

International Affairs—Prerequisite: a bachelor's degree in a related field, including introductory micro- and macroeconomics and at least two years of undergraduate study of a modern foreign language. Required course work includes a core field, a major field, skills-based courses, and electives. The core field consists of three or four courses in political, economic, and historical issues in international affairs. The major fields include international security studies; international economic affairs; international affairs and development; international public health; technology policy and international affairs; international law and organizations; conflict and conflict resolution; U.S. foreign policy; Asia; Latin America; Middle East; Europe and Eurasia.

The academic program must include 3 credits of skills-based courses; up to 6 hours of foreign language credit may be counted toward the degree.

International Development Studies—Prerequisite: a bachelor's degree including introductory microeconomics, a course in statistics, and at least two years of study of a modern foreign language. The program requires core, analytical, and concentration courses and a capstone course abroad in the last semester. Students take a sequence of four core courses together as a cohort. In addition, the program requires courses in policy analysis, research methods, management, and economics. In consultation with the program director, students propose a specialization of six courses in a selected issue or discipline. Major issues and disciplines that constitute international development studies include culture, society, and development; economic development policy; humanitarian assistance; international business; international development management; international education; international health; natural resources and the environment; political science; and women and development. (A self-designed specialization may be proposed with approval of the program director.) Language course credit does not apply toward the degree.

International Science and Technology Policy—Prerequisite: a bachelor's degree in a social, life, or physical science or in engineering. Students take a core field in international science and technology policy and a three-course elective field that may be in an academic department, another Elliott School program, or a specific issue area, such as space policy or economics of technological change. Students must also successfully complete 7 credits of analytical competency. To fulfill this requirement, students may choose between (a) two courses from policy analysis, economic theory, or statistics and one Elliott School skills-based course; or (b) one 3-credit course listed above and 4 credits of skills-based courses. All students must

conduct a policy research project. Courses taken to develop language proficiency may not be counted toward the degree.

International Trade and Investment Policy—Prerequisite: a bachelor's degree including one semester each of introductory micro- and macroeconomic principles and at least two years of a modern foreign language. Applicants are strongly advised to take an introductory statistics course and an intermediate micro- and macroeconomics sequence before beginning the program. The student must complete a core field consisting of economics, political science, history, and quantitative methods course work. A major field is selected from among international economic analysis, international marketing, international banking and finance. Six hours of language course credit may be counted toward the degree.

Latin American and Hemispheric Studies—Prerequisite: a bachelor's degree with background course work related to Latin America and at least two years of study of Spanish or Portuguese. The core requirements include a multidisciplinary foundation course and courses on Latin America chosen from designated courses in three of the following disciplinary fields: anthropology, economics, geography, history, and political science. The major field is taken in anthropology; geography; art history, literature, and culture; economics; international business; international health and development; political science; and history. Six hours of language course credit may count toward the degree.

Middle East Studies—Prerequisite: a bachelor's degree in a related field with at least two years of study of an appropriate language of the region. Students take a core field consisting of four courses selected from history, political science, international affairs, and anthropology; the Middle East studies cornerstone course; four approved courses that form a field in a professional specialization; three elective courses related to the Middle East and chosen in consultation with

the program director; at least one skills course; and the Middle East capstone course. One of the electives may be an advanced language course.

Security Policy Studies—Prerequisite: a bachelor's degree with course work in international affairs or other relevant social sciences, including introductory micro- and macroeconomic principles; study of a modern foreign language is preferred. All students take three courses in the required core field of international security issues. A second field is chosen from U.S. national security policy and process; transnational security issues; intelligence; security and development; defense policy and defense programs; conflict and conflict resolution; political psychology; homeland security; strategic concepts and military history; science, technology, and national security; or regional security. A third field may also be selected from the above or from other M.A. programs in the Elliott School or may be designed in consultation with the program director. Students must successfully complete an economics requirement and skills-based courses. Foreign language credit does not count toward this program.

General Requirements for the Master of International Policy and Practice Degree Program

The Master of International Policy and Practice requires a minimum of 27 credit hours of graduate course work. Students are required to take one course in either international or comparative politics, one course in international economics, and the M.I.P.P. Practicum. For the remainder of the program, students must create a plan of study, approved by the program director, by the end of the first semester in residence.

Under special circumstances 100-level undergraduate courses may be counted toward the master's degree when registration for graduate credit has been approved at the beginning of the course by the program director, the instructor, and the dean. The student who takes an undergraduate course for graduate credit is expected, by arrangement with the instructor, to do

work at the graduate level in addition to the regular work of the course. No more than 6 hours of undergraduate course work may be taken for graduate credit in the 27-credit-hour program.

M.I.P.P. candidates must complete degree requirements within three years of their admission to the program. Students who are temporarily unable to continue their studies may request a leave of absence not to exceed one year. Extensions beyond the three-year period may be granted in exceptional circumstances, but the student will be required to register and pay for 3 credit hours of Reading and Independent Study each semester.

No transfer credit is accepted into the M.I.P.P. program. No more than 6 hours of graduate credit taken in any degree or nondegree status within The George Washington University, including the Elliott School, may be included in the M.I.P.P. program.

Special Programs

Joint Master of Arts and Juris Doctor Degree Program

The Elliott School of International Affairs cooperates with the Law School in offering a program of study leading to the degrees of Master of Arts and Juris Doctor. A student must be accepted for admission by both the Elliott School and the Law School. Applications should be made separately to each school, with a notice of interest in the combined program. The Law School stipulates that the first year of course work for the Juris Doctor degree must be taken as a unit; students should consult with the Law School's Associate Dean for Student Affairs.

As part of this program, each School accepts up to 12 credit hours of course work from the other school in fulfillment of its degree requirements. The Elliott School M.A. portion of the program may not include a thesis. The joint program takes approximately four years of full-time study for completion. Joint degree students must meet all requirements for both programs prior

to receiving either diploma. All work for this combined degree program must be completed in five years, unless an extension of time is granted by the respective deans.

Joint Master of Arts and Master of Business Administration Degree Program

The Elliott School of International Affairs cooperates with the School of Business in offering a program of study leading to the degrees of Master of Arts and Master of Business Administration with a field of study in international business. The joint degree program is offered in all Elliott School M.A. fields, and the M.B.A. is taken with a focus on international business. The student must be accepted for admission by both the Elliott School and the School of Business.

Applications should be made separately to each school, with a notice of interest in the combined program. Students may also apply for the joint degree program after they have begun either program.

As part of this program, each school accepts up to 12 credit hours of course work from the other school in fulfillment of its degree requirements. The joint program takes approximately three years of full-time study for completion. Joint degree students must meet all requirements for each program prior to receiving either diploma. All work for this combined degree program must be completed in six years, unless an extension of time is granted by the respective deans.

Dual Master of Arts and Master of Public Health Degree Program

The Elliott School of International Affairs cooperates with the School of Public Health and Health Services in offering a dual degree program leading toward the Master of Arts and the Master of Public Health in global health. The dual degree program is offered in the Elliott School fields of international affairs, international development studies, Asian studies, European and Eurasian studies, Latin American and hemispheric studies, and Middle East studies. The student must be accepted for admission by both the Elliott School and the School of Public Health and

Health Services. Applications should be made separately to each school, with a notice of interest in the combined program. Students may also apply for the dual degree program after they have begun either program.

As part of this program, the Elliott School accepts up to 12 credit hours of course work from the School of Public Health and Health Services in fulfillment of its degree requirements. The program takes approximately three years of full-time study for completion. Dual degree students may complete the requirements for each degree and receive a diploma for each degree independently. However, all work on each degree must be completed within five years from the student's entry into that program, unless an extension of time is granted by the respective deans.

Graduate Certificates

The Elliott School of International Affairs offers 18-credit graduate certificates in regional studies in Asian studies, European and Eurasian studies, and Latin American and hemispheric studies, and topical specialties in international economic policy, international science and technology policy, international security policy, U.S. foreign policy, and political psychology. The program is open to all graduate students presently enrolled in the Elliott School, Columbian College of Arts and Science, the Graduate School of Education and Human Development, the School of Business, and the School of Public Health and Health Services at The George Washington University, and to graduate students from other universities, persons who have already earned a graduate degree, and persons with a bachelor's degree and a minimum of eight years of relevant work experience. Additional information is available in the Elliott School Graduate Admissions office.

Master of International Studies

The Master of International Studies is a special program open only to students who have completed or are currently enrolled in an approved master's degree program at one of the Elliott School's international partner schools. Master of International Studies students take core courses in economics, history, and political science, plus three courses in an elective field designed with the approval of the program director and a capstone course. All students must meet the Elliott School language requirement.

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COLLEGE OF PROFESSIONAL STUDIES

Dean K.M. Burke

Senior Associate Dean A. Eskandarian

Associate Deans F.C. Arterton, C.B. Cushman

Assistant Dean C. Mokey

The College of Professional Studies offers an expanding range of degree programs leading to associate's, bachelor's, and master's degrees in professional studies, along with a range of certificate programs. At the graduate level, CPS offers the degree of Master of Professional Studies in the fields of landscape design, legislative affairs, molecular biotechnology, paralegal studies, political management, law firm management, security and safety leadership, strategic public relations, and publishing. Graduate certificate programs offered by CPS include landscape design (28 credits), sustainable landscapes (15 credits), political management (18 credits), PACs and political management (15 credits), paralegal studies (18 credits), public relations (18 credits), public leadership (18 credits), fundamentals of strategic security (18 credits), safety leadership (18 credits), law firm management (12 credits), and health care corporate compliance (12

credits). New degree and certificate programs under development as this Bulletin is prepared for press are described at www.cps.gwu.edu.

Information on many CPS courses and on requirements for the degree programs in landscape design, molecular biotechnology, paralegal studies, law firm management, security and safety leadership, strategic public relations, and publishing appears under Professional Studies in the Courses of Instruction section of this Bulletin. CPS programs and courses offered by the Graduate School of Political Management appear under Political Management. Information on graduate certificate requirements and on the regulations of the College of Professional Studies can be found at www.cps.gwu.edu.

Professional studies degree and certificate programs are also offered to organizational clients under contract and can be presented in flexible formats, including series of short classroom-based modules and distance learning.

CPS also administers off-campus programs offered by other schools of the University. The staff of instruction includes members of the full-time faculty of the University and academically qualified adjunct faculty from the professional community. All University off-campus offerings in Maryland are approved by the Maryland State Board for Higher Education; those in Virginia are certified by the State Council of Higher Education for Virginia.

Degree and certificate programs offered by other schools and administered through the College of Professional Studies off-campus division are listed below. Students wishing to apply for admission to an off-campus degree program may obtain application forms from the school concerned, the College of Professional Studies, or online at www.gwu.edu/~gradinfo. CPS also administers the Virginia Campus programs.

Columbian College of Arts and Sciences—For degree program information, see the department or program concerned under Courses of Instruction: Master of Arts in the fields of art therapy and organizational sciences (human resources management and organizational management) and Master of Forensic Sciences (security management and high-technology crime investigation). A graduate certificate is offered in survey design and data analysis; consult the school for requirements.

School of Business—For degree program information, see the section on the School of Business: Master of Science in Information Systems Technology and Master of Tourism Administration.

School of Engineering and Applied Science—For degree program information, see the section on the School of Engineering and Applied Science: Master of Science and Doctor of Science in the fields of engineering management and systems engineering. Graduate certificates are offered in engineering and technology management, homeland security emergency preparedness and response, information technology for justice and public safety, and systems engineering; consult the school for requirements.

Graduate School of Education and Human Development—For degree program information, see the section on the Graduate School of Education and Human Development: Master of Arts in Education and Human Development in the fields of educational leadership and administration, human resource development, and school counseling; Master of Education in the field of secondary education; Education Specialist and Doctor of Education in the field of educational administration and policy studies. A graduate certificate in leadership development and a post-master's certificate in educational leadership and administration are offered; consult the school for requirements.

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Courses

COURSES OF INSTRUCTION

This section provides listings and descriptions of graduate courses offered by the departments and programs of the GW schools included in this Bulletin.

Degree requirements of departments and programs in Columbian College of Arts and Sciences appear under the department or program heading; degree requirements of the School of Engineering and Applied Science, the Graduate School of Education and Human Development, the School of Business, and the Elliott School of International Affairs appear under the respective school's section. Excluding Political Management, College of Professional Studies courses appear in this section under Professional Studies.

To determine the content of required or prerequisite courses below the 200 level, see the Undergraduate Programs Bulletin.

The number of credit hours given for the satisfactory completion of a course is indicated after the title of the course. An academic-year course giving 3 credits each semester is marked (3–3).

Many course descriptions indicate the semester (fall or spring) for which the course is likely to be scheduled. The term *academic year* is used with two-semester courses and generally indicates that the first half of the course is to be offered in the fall semester and the second half in the spring semester. Few offerings for the summer sessions are listed in this Bulletin; consult www.gwu.edu/summer for additional summer offerings. Schedules of Classes are available online at www.gwu.edu/~schedule.

Note that prerequisites indicated near the end of course descriptions are often followed by the phrase *or equivalent*, although this should be understood in all cases; academic departments may

require faculty approval of equivalent prerequisites. Prerequisites that pertain to many or all of a department's courses appear in a note preceding the department's course list.

The courses as listed here are subject to change. The University reserves the right to withdraw any course announced or to change the course fees shown.

Key to Abbreviations

The following abbreviations are used for course designations. (The list excludes designations for courses limited to students in the School of Medicine and Health Sciences.)

Accy	Accountancy
AmSt	American Studies
Anat	Anatomy
Anth	Anthropology
ApSc	Applied Science
Arab	Arabic
AH	Art History
ArTh	Art Therapy
Astr	Astronomy
Bioc	Biochemistry
BiSc	Biological Sciences
BmSc	Biomedical Sciences
Bios	Biostatistics
BAdm	Business Administration
Chem	Chemistry
Chin	Chinese

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CE	Civil Engineering
Clas	Classical Studies
CPS	College of Professional Studies
CCAS	Columbian College of Arts and Sciences
Comm	Communication
CSci	Computer Science
Cnsl	Counseling
DnSc	Decision Sciences
EALL	East Asian Languages and Literatures
Econ	Economics
Educ	Educational Leadership
ECE	Electrical and Computer Engineering
EHS	Emergency Health Services
EMSE	Engineering Management and Systems Engineering
Engl	English
EAP	English for Academic Purposes
EnRP	Environmental and Resource Policy
Epid	Epidemiology
ExSA	Exercise and Sport Activities
ExSc	Exercise Science
Film	Film Studies
Fina	Finance
FA	Fine Arts

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ForS	Forensic Sciences
Fren	French
Geog	Geography
Geol	Geological Sciences
Ger	German
Grek	Greek
PSHC	Health Care Corporate Compliance
HSci	Health Sciences
HSML	Health Services Management and Leadership
Hebr	Hebrew
Hist	History
HomP	Hominid Paleobiology
Honr	Honors
HDev	Human Development
HOL	Human and Organizational Learning
HmSr	Human Services
Hmn	Humanities
ISTM	Information Systems and Technology Management
IntD	Interior Design
IAff	International Affairs
IBus	International Business
Ital	Italian
Japn	Japanese

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Kor	Korean
PSLD	Landscape Design
Latn	Latin
Law	Law
PSLM	Law Firm Management
Ling	Linguistics
Mgt	Management
Mktg	Marketing
MBAd	Master of Business Administration
Math	Mathematics
MAE	Mechanical and Aerospace Engineering
Micr	Microbiology and Immunology
PSMB	Molecular Biotechnology
MMed	Molecular Medicine
MStd	Museum Studies
Mus	Music
NSc	Naval Science
OrSc	Organizational Sciences
PSLX	Paralegal Studies
Path	Pathology
PStd	Peace Studies
Pers	Persian
Phar	Pharmacology

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Phil	Philosophy
Phys	Physics
Phyl	Physiology
PMgt	Political Management
PPsy	Political Psychology
PSc	Political Science
Port	Portuguese
PsyD	Professional Psychology
Psyc	Psychology
PAd	Public Administration
PubH	Public Health
PSPL	Public Leadership
PPol	Public Policy
PSPR	Public Relations
PSPB	Publishing
Rel	Religion
Rom	Romance Literatures
SEAS	School of Engineering and Applied Science
SMPA	School of Media and Public Affairs
PSSL	Security and Safety Leadership
Slav	Slavic
Soc	Sociology
Span	Spanish

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SpEd Special Education

SpHr Speech and Hearing

Stat Statistics

SMPP Strategic Management and Public Policy

TrEd Teacher Education

TrDa Theatre and Dance

TStd Tourism Studies

Univ University

UW University Writing

Viet Vietnamese

WLP Women's Leadership Programs

WStu Women's Studies

Ydsh Yiddish

Explanation of Course Numbers

Courses numbered through the 100s are intended for undergraduates. Numbers up to 100 generally indicate courses for freshmen and sophomores; these courses may not be taken for credit by graduate students. Numbers in the 100s indicate courses planned for juniors and seniors; with approval of the dean and instructor, the courses may be taken for graduate credit provided that approval has been received before registering and that additional course work is assigned and completed.

Courses numbered in the 200s and 300s are intended for graduate students; the courses may be taken by qualified juniors and seniors with approval of the instructor. A few courses are

numbered in the 400s and 800s to set them apart for administrative reasons; the courses are often analogous to courses numbered in the 200s.

Courses numbered 701, 721, and 751 represent an ongoing program of curriculum innovation at GW. Courses numbered in the 770s and 780s are taught by scholars who hold appointments as University Professors. The 700 numbers do not indicate the level of difficulty.

ACCOUNTANCY

Professors K.R. Kumar, S.H. Kang, W.R. Baber

Associate Professors L.G. Singleton, K.E. Smith (*Chair*), L.C. Moersen, F. Lindahl, R.L.

Tarpley

Assistant Professors C.L. Jones, S. Hansen, M. Sullivan, A. Gore, S. Kulp, Y. Li, Y. Xue, I.Y.

Kim

See the School of Business for programs of study in accountancy leading to the degrees of Master of Accountancy and Doctor of Philosophy.

201 **Financial Accounting** (2 or 3) Singleton, Jones, Tarpley

Basic concepts and methods used in financial statements. Use and preparation of the income statement, balance sheet, and statement of cash flows; application of concepts to accounting and reporting issues, including revenue and expense recognition, cash, receivables, inventory, marketable securities, long-lived assets, and debt and equity securities. (Fall and spring)

202 **Managerial Accounting** (2) Kulp, Lindahl, Hansen, Baber

The role of accounting in the decision-making processes of management; understanding of how accounting influences resource allocation decisions in the organization. Prerequisite: Accy 201. (Fall and spring)

- 211 **Business Law: Contracts, Torts, and Property (3)** Moersen
Essential legal principles of contracts, torts, and property, including trusts and estates, leases, professional liability, and the Uniform Commercial Code. (Fall)
- 212 **Business Law: Enterprise Organization (3)** Moersen
The legal aspects of organizing, financing, and operating an enterprise: agency, partnerships, corporations, securities regulation, insurance, suretyship, secured credit financing, and commercial paper. (Spring)
- 221 **Cost and Budget Analysis (3)** Staff
An advanced cost analysis course, with emphasis on comparative costs, quantitative techniques for cost data, managerial reporting systems, and manufacturing efficiency studies. Prerequisite: Accy 202. (Fall and spring)
- 225 **Financial Reporting Standards (3)** Smith, Xue
A critical understanding of the Financial Accounting Standards Board Pronouncements and professional standards for compilation of financial statements. Analysis of alternative accounting treatments by management in financial reporting. Prerequisite: Accy 201. (Fall and spring)
- 251 **International Accounting (3)** Lindahl
A study of international accounting standards with emphasis on accounting for foreign conversion requirements compatible with U.S. accounting standards. Prerequisite: Accy 201. (Spring)
- 261 **Federal Income Taxation (3)** Smith and Staff

- A study of federal income taxation, covering gross income, deductions and credits, sales and other disposition of property, capital gains and losses, and timing of income and deductions. (Fall and spring)
- 262 **Federal Income Taxation of Partnerships (3)** Smith and Staff
Financial and tax accounting for partnerships; formation and operation, distribution to partners, liquidation, and transfer of partnership interests. S corporations are also considered. Prerequisite: Accy 261. (Spring)
- 263 **Federal Income Taxation of Corporations (3)** Smith and Staff
Federal income taxation of C corporations, covering formation, capital structure, nonliquidating distributions, complete liquidations, corporate accumulations, and the alternative minimum tax. Prerequisite or concurrent registration: Accy 261.
(Fall and spring)
- 266 **Financial and Tax Accounting for Corporate Combinations (3)** Smith
Financial and tax accounting for intercorporate investments and corporate acquisitions and for consolidated groups of corporations. Consolidation procedures, accounting for goodwill, intercompany sales, foreign subsidiaries, and taxation of the corporations and their shareholders. Prerequisite: Accy 201, 261. (Spring)
- 275 **Contemporary Auditing Theory (3)** Gore
A comprehensive survey of contemporary auditing as practiced by external auditors (primarily certified public accountants) and internal auditors (those employed within government and corporate entities). Generally accepted auditing standards; government auditing standards. Planning, directing, and reporting on various audits. Prerequisite: Accy 225. (Fall and spring)

- 276 **Government Accounting and Auditing (3)** Staff
- The budgeting, accounting, financial reporting, and auditing required of federal, state, and local governments, nonprofit organizations, and colleges and universities. The financial practices and requirements applicable to organizations receiving governmental financial assistance and those subject to governmental audits.
- Prerequisite: Accy 201. (Spring)
- 282 **Accounting Information Systems and EDP (3)** Staff
- Development and application of accounting system theory, including analysis, design, control concepts, and implementation. Integration of electronic data processing, accounting systems, and management information systems. Prerequisite: Accy 201. (Fall)
- 290 **Special Topics (1 to 3)** Staff
- Experimental offering; new course topics and teaching methods. May be repeated once for credit. (Fall and spring)
- 291 **Financial Statement Analysis (3)** Kang, Kumar, Hansen
- Analysis and interpretation of financial statements for managers, stockholders, creditors, and financial analysts; ratio-driven financial analysis: earnings-based and cash-flow-based equity valuation; sales and EPS forecasting; preparation of projected financial statements. Prerequisite: Accy 201. (Fall and spring)
- 297 **International Management Experience (3)** Staff
- Same as Fina/IBus/Mgt/Mktg/SMPP 297. May be repeated for credit.
- 298 **Directed Readings and Research (1 to 3)** Staff
- 311 **Seminar: Public–Private Sector Institutions and Relationships (3)** Staff

Same as SMPP 311.

391 **Doctoral Seminar** (arr.) Baber, Kang, Kumar, Lindahl

Reasoning and research in technical areas of accounting; theoretical issues and their application to practice; conceptual themes in professional literature; comparative accounting research analyses. (Fall and spring)

397 **Doctoral Seminar** (1 to 3) Staff

398 **Advanced Reading and Research** (arr.) Staff

Limited to doctoral candidates preparing for the general examination. May be repeated for credit.

399 **Dissertation Research** (arr.) Staff

Limited to doctoral candidates. May be repeated for credit.

AMERICAN STUDIES

Professors J.M. Vlach, R.W. Longstreth, J.A. Miller (*Chair*), P.M. Palmer

Associate Professors T.A. Murphy, M. McAlister, C. Heap, T. Guglielmo

Assistant Professors J.K. Kosek, S. Osman, E. Pena, E. Anker

Professorial Lecturers R.D. Wagner, O. Ridout, F. Goodyear

Master of Arts in the field of American studies—Prerequisite: the degree of Bachelor of Arts in American studies or a related field.

Required: the general requirements stated under Columbian College of Arts and Sciences.

The program requires 36 credit hours, including AmSt 201, at least two research seminars, and 27 additional credits of courses pertaining to the study of American culture.

Master of Arts in the field of American studies with concentration in folklife—Prerequisite: the degree of Bachelor of Arts in American studies or a related field.

Required: the general requirements stated under Columbian College of Arts and Sciences. Course work in this 36-credit degree program emphasizes the expressive culture of American folk societies and theories and methods for their evaluation and interpretation. AmSt 201, 256, and 257 are required, along with at least two designated research seminars and 21 additional credits of courses pertaining to the study of American culture. Courses in topics related to folklife, such as regionalism, oral history, material culture, vernacular architecture, and social and cultural history are recommended.

Master of Arts in the field of American studies with concentration in historic preservation—

Prerequisite: the degree of Bachelor of Arts with a course in American architectural history.

Required: the general requirements stated under Columbian College of Arts and Sciences. Course work in this 36-credit degree program focuses on interpreting issues in historic preservation through a humanistic framework. AmSt 201, at least one designated research seminar, and at least 6 additional credits of general American studies courses are required, along with at least 18 credits of historic preservation courses, including AmSt 277–78. With departmental approval, students may undertake an optional thesis (AmSt 299–300) for 6 credit hours. A comprehensive examination in historic preservation is required.

*Master of Arts in the field of American studies with concentration in museums and material culture—*Prerequisite: the degree of Bachelor of Arts in American studies or a related field.

Required: the general requirements stated under Columbian College of Arts and Sciences. Course work in this 36-credit degree program, offered in association with the Smithsonian Institution, emphasizes the use of artifacts in historical research. AmSt 201 and 250 are required, along with at least two designated research seminars and 24 additional credits of courses pertaining to the study of American culture. Courses in decorative arts, architectural history,

historical archaeology, history of technology, history of art, and folklife are recommended.

Programs specific to museum studies and museum education are also available.

Doctor of Philosophy in the field of American studies—This program combines work in the humanities and/or social sciences as preparation for careers in a range of institutions, including universities, museums, archives, libraries, preservation offices, and related public and private enterprises. Applicants are required to have an adequate background in the humanities and/or social sciences as they apply to the understanding of American studies.

Required: the general requirements stated under Columbian College of Arts and Sciences. All students must take AmSt 201, at least two designated research seminars, and at least one theory course approved by the advisor. Candidates must pass a General Examination in three areas, to be taken over the course of one month, by the end of the third year from matriculation. The three fields are elected with approval of the advisory committee and should constitute a coherent, interdisciplinary program of study; one field may be devoted to the comparative study of a non-U.S. culture.

With permission, a limited number of 100-level courses in the department may be taken for graduate credit; additional course work is required. See the Undergraduate Programs Bulletin for course listings.

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|-----|--|-------------------|
| 201 | Seminar: Scope and Methods in American Studies (3) | Murphy, McAlister |
| | Consideration of American studies as an area for research and teaching; introduction to bibliography. Required of candidates for the degree of Master of Arts in the field of American studies. (Fall) | |
| 226 | Theories and Practices in the Study of Media (3) | McAlister, Anker |

Examination of theories and methods in the study of media and popular culture; case studies explore specific issues related to cultural products such as film, television, music, and the Internet.

232 **Cultural Theory and American Studies (3)** McAlister

Major issues in critical and cultural theory as they relate to American culture. Various interpretive approaches including discourse analysis, cultural studies, new historicism, anthropological theory, etc. Prerequisite: AmSt 231 or permission of instructor.

(Spring, alternate years)

244–45 **Gender, Sexuality, and American Culture (3–3)** Staff

The changing social organization, cultural representation, and meaning of gender and sexuality in the United States, with emphasis on their relationship to race, class, region, nationality, empire, and globalization. AmSt 244: pre-Columbian settlement to 1876; AmSt 245: 1877 to present. Same as Hist 244–45.

256 **Folklore Theory (3)** Vlach

An intellectual history of American folklore research; analysis of particular theories and methods. Same as Anth 296. (Spring)

257 **Seminar: American Folklife (3)** Vlach

Research and discussion on the traditional cultures of various geographical regions of the United States. Analysis of folk art, craft, and architecture; regional and ethnic identities. Same as Anth 297. (Fall)

259 **Topics in American Folklife (3)** Staff

- A seminar devoted to a variety of subjects related to folklore and folklife, such as public folklore policy, folk music, or ethnic folklore and culture. Specific topic to be determined by the interests of available faculty and the needs of the folklife program.
- 262 **The United States in a Global Context (3)** McAlister
- Analysis of the cultural constructions of the nation and international power, comparing the context of the 18th and 19th century, European colonialism, and U.S. expansion in the 20th century. The role of literature and mass media in furthering the logic of globalization. Readings are both theoretical and historical.
- 268 **Readings in American Cultural History (3)** Staff
- Studies in the cultural history of the United States, focusing on major historiographic debates and interventions. Examples of possible topics include cultural contact, the public sphere, and systems of religious and political belief. Same as Hist 268.
- (Alternate years)
- 269 **Religion and American Culture (3)** Kosek
- Interdisciplinary analysis of religious beliefs, practices, and representations in the United States, as well as intersections of the religious and the secular. Relationships of religion to race, gender, capitalism, science, mass media, and material culture. Same as Hist 269.
- 270 **Theory and Practice of Public History (3)** Staff
- Theoretical and practical dimensions of public history, as illustrated by recent controversies surrounding public exhibitions and debates on revisionist history as well as more traditional means of presenting the past in public forums. Same as Hist 270.

- 271 **Race in America (3)** Guglielmo
Interdisciplinary analysis of the history of race and its changing political, social, and cultural meanings in the United States. Transnational racial formations, struggles for and against civil rights, multiracialism, and interracialism. Same as Hist 271.
- 272 **American Social Movements (3)** Guglielmo
The history of social movements in the United States, with emphasis on civil rights, feminism, conservatism, and labor in local, national, and transnational contexts; the historical rise and fall of these movements and their larger impact on American life. Same as Hist 272.
- 273 **Readings on Women in American History (3)** Harrison
Same as Hist/WStu 273.
- 275 **The Politics of Historic Preservation (3)** Staff
Overview of the political issues, forces, events, and players that have shaped contemporary preservation practice, with an emphasis on public policy issues that have not been resolved and continue to confront preservation objectives. Prerequisite: Permission of instructor. (Spring)
- 276 **Economics of Preservation (3)** Wagner
Analysis of economic techniques and benefits used to encourage the retention and reuse of historic buildings and districts in the United States. Emphasis on revitalization of older commercial centers and the Mainstreet program. Prerequisite: Permission of instructor. (Spring)
- 277–78 **Historic Preservation: Principles and Methods (3–3)** Longstreth

- The scope and purpose of the preservation movement in the United States, with focus on developments since the 1960s. Preservation theories, attitudes toward the past and toward design, the intent and impact of legislation, approaches to documentation, the concept of significance, and preservation as an instrument of change. Same as Hist 277–78. (Academic year)
- 280 **Field Methods in Architectural Documentation (3)** Ridout
In-depth thematic examination of cultural landscape, focusing on field techniques for recording, analysis, and interpretation of historic properties. Work at field sites is supplemented by lectures, discussion, and readings. (Fall)
- 281 **Cityscapes (3)** Osman
Interdisciplinary examination of the American city, including urban theory, history, planning, architecture, urban politics, and cultural representations of the city. Same as Hist 281.
- 282 **Seminar in American Architecture (3)** Longstreth
Advanced research problems addressing artistic, cultural, social, technical, and urbanistic aspects of American architecture in the 19th and 20th centuries. Topics vary. Prerequisite: AmSt 175 or 176 or equivalent, or permission of instructor. (Spring, alternate years)
- 286 **Interpretation in the Historic House Museum (3)** Stapp
Same as Educ 286.
- 287 **U.S. Urban History (3)** Heap, Osman
History of American urban life and culture from the Colonial era to the present, focusing on the transitions from pre-industrial to industrial and post-industrial forms,

	the social and spatial configuration of U.S. cities, and the urban politics of race, class, and gender. Same as Hist 287.	
289	Topics in American Studies (3)	Staff
	May be repeated for credit provided the topic differs.	
290	Research Seminar in American Studies (3)	Staff
	May be repeated for credit provided the topic differs.	
294	Historical Archaeology Field Program (3)	Staff
	Same as Anth 213.	
295	Independent Study (arr.)	Staff
	Limited to master's and doctoral candidates. Written permission of instructor required.	
299–300	Thesis Research (3–3)	Staff
398	Advanced Reading and Research (arr.)	Staff
	Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.	
399	Dissertation Research (arr.)	Staff
	Limited to Doctor of Philosophy candidates. May be repeated for credit.	

Courses Offered in Affiliation with the Smithsonian Institution

Columbian College of Arts and Sciences is affiliated with the Smithsonian Institution's American Studies Program. The following courses are offered at the Smithsonian Institution.

250	American Material Culture (3)	Mayo
	Opportunities for research and publication based on historical objects in the collections of the Smithsonian Institution.	

251 **Museum Research and Education (3)**

Mayo

Work or study under the direction of Smithsonian staff members and research associates—topics include museum visitor behavior, costumes and furnishings, decorative arts, and photography as historical documentation.

252–53 **American Decorative Arts (3–3)**

Staff

Recognition and evaluation of domestic artifacts from the 17th, 18th, and 19th centuries.

284 **Seminar: Studies in American Art and History (3)**

Goodyear

Selected problems and themes in American cultural history involving the use of artistic materials in different media; emphasis on methodology and analytic techniques. May be repeated for credit. Same as AH 255.

ANTHROPOLOGY

University Professor B. Wood

Professors A.S. Brooks, C.J. Allen (*Chair*), J.M. Vlach, D. Gow, J.C. Kuipers, B.D. Miller, R.R. Grinker, P.W. Lucas

Associate Professors E.H. Cline, M. Edberg, B.G. Richmond, S.C. Lubkemann

Assistant Professors R.M. Bernstein, A.S. Dent, J. Blomster, C. Sherwood, R. Shepherd, P.

Kelly, I. Feldman

Professorial Lecturers P.J. Cressey, D.H. Ubelaker, R. Potts, J. Love, S. Johnston

Master of Arts in the field of anthropology—Prerequisite: a bachelor's degree; a major in anthropology is preferred but not mandatory. The undergraduate program should have included courses above the introductory level in anthropological theory, social organization, linguistics, archaeology, and biological anthropology. Students with less background in anthropology may

be admitted but may be required to take one or more undergraduate courses to make up deficiencies before beginning the degree program.

1. *General degree*—Required: the general requirements stated under Columbian College of Arts and Sciences. The minimum requirement consists of 36 credit hours of approved graduate course work, generally including a thesis (Anth 299–300). Under certain circumstances, the department may permit substitution of an internship or independent research for a thesis. Anth 202 must be included in the program of study and should be completed during the first academic year of graduate work. Anth 201, 203, and 204 are required, although those who have completed analogous upper-level undergraduate course work may request a waiver. Only two proseminars may be waived. For students with fewer than four undergraduate semesters of a major foreign language, a reading knowledge examination must be passed before beginning the third semester of graduate work. All students must pass an approved methods course and the Master's Qualifying Examination associated with each proseminar they take.

2. *With a concentration in museum training*—Required: the general requirements stated under Columbian College of Arts and Sciences. The program of study is the same as that described for the general degree, above, but must include from 12 to 15 credit hours of work in museum-related courses, 6 credit hours of which may be in an internship. No thesis is required. Students whose primary interest is in museum techniques, rather than anthropology, are advised to apply to the master's program in museum studies (see Museum Studies). A program in museum education is also available through the Graduate School of Education and Human Development.

3. *With a concentration in folklife*—Required: the general requirements stated under Columbian College of Arts and Sciences. The program of study is the same as that described for the general degree, above, but must include Anth 296 and 297.

4. *With a concentration in international development*—Required: the general requirements stated under Columbian College of Arts and Sciences. The program of study is the same as that described for the general degree, above, but must include Anth 220 and 223; two courses chosen from Anth 221, 222, 224, 250, 251, 257; and an approved graduate-level course in quantitative analysis. A thesis is not required, but may be allowed in some circumstances. The program is designed to improve the student's understanding of development problems, such as economic change, population, health, education, migration, and ecology, within an anthropological framework. Internships at public and private development agencies in the Washington area are encouraged. The Elliott School of International Affairs offers a program in international development studies, with a disciplinary specialization in anthropology.

Master of Science and Doctor of Philosophy in the field of hominid paleobiology—see Hominid Paleobiology.

With permission, a limited number of 100-level courses in the department may be taken for graduate credit; additional course work is required. See the Undergraduate Programs Bulletin for course listings.

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| 201 | Proseminar in Biological Anthropology (3) | Bernstein, Sherwood |
| | Comprehensive overview of theory and practice in biological anthropology. (Fall) | |
| 202 | Proseminar in Sociocultural Anthropology (3) | Lubkemann, Grinker, Allen |
| | Comprehensive overview of theory and practice in sociocultural anthropology.
(Fall) | |

- 203 **Proseminar in Archaeology (3)** Blomster
Survey of the most recent archaeological techniques and theoretical approaches to reconstructing and interpreting the cultures of the past. (Spring)
- 204 **Proseminar in Linguistic Anthropology (3)** Kuipers, Dent
Contemporary anthropological studies of language in biological, social, and historical perspectives. (Spring)
- 213 **Historical Archaeology Field Program (3)** Cressey
Practical experience with a variety of excavation and laboratory techniques in historical archaeology; specific site and topics announced in the Schedule of Classes. Same as AmSt 294. (Summer)
- 214 **Paleoanthropological Field Program (3 or 6)** Brooks
Intensive course on field research in paleoanthropology, including excavation methods, identification and analysis of materials, paleoecology, archaeology, and human anatomy. Conducted at selected sites in Eurasia, Africa, or Australia. Visits to comparative sites and collections in the region. (Summer)
- 217 **Methods in Sociocultural Anthropology (3)** Lubkemann
Epistemology; the definition of research problems; selection of research subjects and sites; techniques of data collection (e.g., surveys, interviews); data management and organization; ethical protocols; issues of safety; grant writing and funding.
- 218 **Archaeological Theory (3)** Blomster
Overview of major theories and positions in American archaeology; examination of new issues and directions in which the field appears to be moving.
- 219 **Lab Research Methods in Archaeology (3 or 4)** Brooks, Blomster, and Staff

- Research methods and techniques used by archaeologists. Emphasis on hands-on experience in one or more techniques. Laboratory fee. (Spring, alternate years)
- 220 **The Anthropology of Development** (3) Miller and Staff
- Theoretical perspectives that distinguish the contribution of anthropology to understanding processes of change in the Third World. Focus on health, population, environment, gender, and tourism issues. The role of anthropology in planning and implementing projects and policy. (Fall)
- 222 **Issues in Development** (3) Miller and Staff
- Topic to be announced in the Schedule of Classes. May be repeated for credit provided the topic differs.
- 223 **Research Methods in Development Anthropology** (3) Miller and Staff
- Anthropologists' roles in multidisciplinary teams, including research-related activities, such as feasibility studies, social soundness analysis, and evaluations. Innovative research techniques, such as interactive data gathering, team survey methods, and rapid rural appraisal. Admission by permission of instructor. (Spring)
- 224 **Internship in Development Anthropology** (3) Miller
- Supervised participation in a selected development agency or other relevant organization. Opportunity to observe agency procedures and gain practical experience. Admission by permission of instructor or department chair. (Fall, spring, and summer)
- 230 **Anthropology in the Museum** (3) Staff

How anthropological collections take shape in the past and carry meaning in the present. Research and analysis of existing collections; issues in museum anthropology.

231 **Museums and the Public: Exhibiting Culture (3)** Staff

Study of the issues and problems involved in “exhibiting culture,” past and present, including issues of representation, message and interpretation, audience, ownership of objects and symbols, and ways of reconstructing the past. Critical examination of museum exhibits.

232 **Museum Preventive Conservation I (3)** Staff

Same as MStd 232/AH 286.

233 **Museum Preventive Conservation II (3)** Staff

Same as MStd 233/AH 287.

234 **Problems in Conservation (3)** Staff

Individual conservation projects to determine composition, construction, decomposition of materials, and possible stabilization techniques. Conservation laboratory experience. Prerequisite or concurrent registration: Anth 232/AH 286.

236 **Internship in Museum Anthropology (1 to 6)** Blomster

Supervised individual research and/or field work at the Smithsonian Institution or other area museums, arranged in consultation with the museum and the Anthropology Department. Admission by arrangement with the department chair or museum training advisor. May be repeated for credit up to a maximum of 6 credits.

(Fall and spring)

237 **Ethics and Cultural Property (3)** Blomster and Staff

- Survey of ethical issues in anthropology, focusing on cultural property and repatriation; the epistemological, ethical, and political dilemmas of excavating, collecting, and owning cultural artifacts.
- 241 **Human Functional Anatomy (3)** Lucas
- Growth and function of the musculoskeletal system, including the development, anatomy, and histology of bone, biomechanics of muscle and skeletal tissue, craniofacial and dental growth and morphology, and locomotion. No prior knowledge of anatomy required. Laboratory fee. (Fall)
- 243 **Human Growth and Development (3)** Bernstein
- Modern human growth and development considered through an evolutionary perspective. The growth stages and life cycles of modern humans, emphasizing physiological and environmental influences and comparisons with extant non-human primates and fossil hominids. Laboratory fee. (Spring, alternate years)
- 244 **Analytical Methods in Human Evolutionary Studies (3)** Richmond
- A survey of methods and approaches for data collection and analysis in human evolutionary biology research. Topics include comparative methods and basic and multivariate statistics. (Spring, alternate years)
- 245 **The Evolution of Primate Life Histories (3)** Bernstein
- Recent developments in the study of human and non-human life histories. Life history theory. Life history traits compared among primate groups in order to determine how selective pressures have shaped extant primate life history patterns. Laboratory fee. (Spring, alternate years)
- 247 **Paleoanthropology (1 to 3)** Brooks, Wood, and Staff

Survey of current research in hominid and hominoid evolution, focusing on the integrated nature of the field. Contributions from the geological and biological sciences will be stressed, together with innovative geochemical techniques for establishing chronological sequences. Prerequisite: Anth 147 or BiSc 150 or equivalent. (Spring)

249 **Topics in Biological Anthropology (3)** Staff

Topic announced in the Schedule of Classes. Instructors will be drawn from GW faculty and Smithsonian Institution staff. May be repeated for credit if topic varies.

250 **Nationalism and Ethnicity (3)** Grinker

Major theoretical and ethnographic issues in the study of nationalism worldwide.

Explores how ethnic groups emerge in colonial and contemporary plural societies and how states attempt to integrate ethnic groups into nations.

251 **Anthropology and Contemporary Problems (3)** Staff

Exploration of anthropological perspectives on a current issue, such as refugees, ethnic violence, national mythologies, and women's health in developing countries.

Topic announced in the Schedule of Classes. May be repeated for credit provided the topic differs.

254 **Medical Anthropology (3)** Miller

Concepts of medical anthropology, including the cultural construction of illness, the somatic expression of distress, and ethnopsychiatry; "critical" versus "conventional" medical anthropology. (Fall)

257 **Gender and Sexuality (3)** Kelly

Study of new theoretical and methodological approaches developed in the anthropology of gender. Topics include postcolonialism, sexuality, and literary representations of gender.

- 258 **Anthropology of Art, Aesthetics, and Symbolism (3)** Allen

Anthropological approaches to aesthetic problems and theories of symbolism in the context of ethnographic materials. (Fall, alternate years)

- 259 **Topics in Sociocultural Anthropology (3)** Allen and Staff

Topic announced in the Schedule of Classes. May be repeated for credit if the topic varies.

- 269 **Topics in Linguistic Anthropology (3)** Kuipers and Staff

Topic announced in the Schedule of Classes. May be repeated for credit if the topic varies.

- 272 **Anthropology of Latin America (3)** Allen and Staff

Intensive study of a selected topic in the anthropology of Central and/or South America. Topic to be announced.

- 281 **Problems in Mesoamerican Archaeology (3)** Blomster

Topics range from specific civilizations, such as the Olmec, to pan-Mesoamerican topics, such as religion and exchange. May be repeated for credit.

- 282 **Problems in New World Archaeology (3)** Blomster, Cressey, and Staff

Current archaeological problems relating to the origin and development of aboriginal cultures. Specific topic to be announced in the Schedule of Classes. May be repeated for credit.

- 283 **Paleolithic Archaeology (3)** Brooks and Staff

- Current problems in relation to materials from the Old World. (Fall)
- 286 **Technology** (3) Blomster and Staff
- Cross-cultural examination of the form, function, meaning, and use of material culture and the behavior patterns involved in its production. Topic announced in the Schedule of Classes.
- 287 **Public Archaeology** (3) Cressey
- The use and creation of the past and the relationship between archaeologists and different publics. (Spring, alternate years)
- 288 **Problems in Mediterranean and European Archaeology** (3) Cline and Staff
- Topic announced in the Schedule of Classes. Topics may include Bronze Age conflict, the Celts, etc. May be repeated for credit.
- 289 **Topics in Archaeology** (3) Staff
- Major issues related to the theory and practice of archaeology. Topic announced in the Schedule of Classes.
- 295 **Research** (arr.) Staff
- May be repeated for credit.
- 296 **Folklore Theory** (3) Vlach
- An intellectual history of American folklore research; analysis of particular theories and methods. Same as AmSt 256. (Spring)
- 297 **Seminar: American Folklife** (3) Vlach
- The materials of American folk culture, concentrating on folk architecture, crafts, and art. Major organizing themes are regionalism and the use of objects as indicators of cultural intention. Same as AmSt 257. (Fall)

299–300 **Thesis Research (3–3)**

Staff

APPLIED SCIENCE

Interdepartmental course offerings in the School of Engineering and Applied Science.

211 Analytical Methods in Engineering I (3)

Lee, Haque

Engineering applications of the theory of complex variables: contour integration, conformal mapping, inversion integral, and boundary–value problems. Prerequisite: approval of department. (Fall)

212 Analytical Methods in Engineering II (3)

Lee, Haque

Algebraic methods appropriate to the solution of engineering computational problems: linear vector spaces, matrices, systems of linear equations, eigenvalues and eigenvectors, quadratic forms. Prerequisite: approval of department. (Spring)

213 Analytical Methods in Engineering III (3)

Haque, Lee

Analytical techniques for solution of boundary–initial-value problems in engineering: wave propagation, diffusion processes, and potential distributions. Prerequisite: approval of department. (Fall)

214 Analytical Methods in Engineering IV (3)

Haque

Introduction to variational methods in engineering: Ritz and Galerkin approximation methods of boundary–value problems, aspects of linear integral equations arising from engineering analysis. Prerequisite: approval of department. (Spring, even years)

215 Analytical Methods in Engineering V (3)

Staff

Advanced methods of solution of boundary–initial-value problems in engineering: characteristics, wave propagation, and Green’s functions. Prerequisite: ApSc

213. (Fall, odd years)

216 Special Topics in Engineering Analysis (3)

Staff

Selected topics, such as perturbation techniques applied to approximate solution of nonlinear boundary and initial-value problems in engineering; application of singular integral equations in problems of mechanics. Prerequisite: approval of department. (As arranged)

ART

See **Fine Arts and Art History**.

ART THERAPY

Assistant Professor H. Bardot (*Acting Director*)

Adjunct Professor T. Tripp

Professorial Lecturers P. Howie, A. Di Maria, B. Sobol

Lecturers D. Brancheau, C. Doby-Copeland, T. Svat, L. Milofsky, T. Council

Clinical Instructors S. Thomas, E.J. Endler, L.R. Garlock, K. Hanrahan-Havern, M. Urbia, C.

Crum, S. Rosen, N. Parfitt, K. Coelho, R. Janoff, C. Stern, C. Goucher, A. Caroselli, C. Hurst,

H. Stemas, D. Benshalom, B. Robertson

Master of Arts in the field of art therapy—Prerequisite: a bachelor’s degree, evidence of significant training and/or experience in art, including painting, drawing, and clay modeling; course work in the behavioral and/or social sciences, including personality theory, abnormal psychology, and child psychology.

Required: the general requirements stated under Columbian College of Arts and Sciences and successful completion of 49 credit hours of graduate course work, including ArTh 201, 203, 205, 207, 208, 220, 224, 225, 228, 230, 231, 240, 275, 280, 292–94, 295.

Fields of emphasis: adult art therapy, family art therapy, child art therapy, and research. Students wishing to extend their training to the doctoral level are encouraged to apply to the Doctor of Psychology program. See Professional Psychology.

A graduate certificate in art therapy is available to those who have earned or are currently enrolled in a graduate program in a related field.

Note: ArTh 211 is designed for advanced undergraduates and others as an introduction to the field. The following other courses that are open to non-art therapy students require permission of the instructor or program director: ArTh 205, 207, 208, 228, 230, 231, 240, 275, 280, 289, 290.

201 History and Theory of Art Therapy (2) Bardot

Art therapy history and theory, milestones and practitioners. The development of art therapy as a distinct therapeutic practice. Overview of psychotherapy theories relevant to art therapy. Open only to art therapy students. (Fall)

203 Studio/Technique of Art Therapy (3) Milofsky

Direct experience of the therapeutic utility and psychological influence of art processes and materials. Identifying the effect of art-making leading to assessment and intervention strategies. Open only to art therapy students. (Fall)

205 Marital and Family Art Therapy/Counseling (3) Howie, Sobol

Principles of work with couples and families, including an overview of systems theories and stages of family life cycle development. The use of art techniques for evaluation of family dynamics. Videotaped observation of family art evaluations in

- clinical settings. Intervention strategies address cultural issues and ethical considerations. (Fall)
- 207 **Child Art Therapy (2)** Di Maria
- Practical, theoretical, and ethical considerations involved in treating children in clinical and educational settings. Application of art therapy and counseling principles and practice for diverse child populations. Development of interventions for varied DSM–IV diagnoses. (Fall)
- 208 **Adolescent Art Therapy (2)** Council
- Practical, theoretical, and ethical considerations involved in treating adolescents in clinical and educational settings. Assessment and treatment issues integrating the use of art techniques specifically designed for this population. Application of art therapy and counseling principles and practice for diverse adolescent populations. Development of interventions for varied DSM–IV diagnoses. (Spring)
- 211 **Survey of Art Therapy (3)** Svat
- Use of visual arts to enhance personal development; history, theories, range of practice in art therapy. Illustrated lectures, reading, discussion, studio work. Not intended for art therapy degree candidates. Open to advanced undergraduates and others as an introduction to the field. (Fall and spring)
- 220 **Research Methods (3)** Staff
- Planning, conducting, and evaluating relevant methodologies, including qualitative and quantitative approaches and basic statistics. The importance of research in the psychotherapy professions; ethical and legal considerations; and the use of research to assess effectiveness of mental health and art therapy services. (Spring)

224 **Counseling/Art Therapy Process (3)** Brancheau

Theoretical and clinical dimensions of counseling and art therapy explored through study of current research concerning the diverse elements affecting the therapeutic process. The goals of each phase of treatment; development of the therapeutic alliance; assessment of client readiness; therapeutic techniques and interventions as practiced in short- and long-term treatment. (Fall)

225 **Counseling/Art Therapy Theory (3)** Staff

Overview of major theories in counseling and psychotherapy in light of the creative process and other aspects of the clinical practice of art therapy. Client art and art-making, and the therapeutic encounter and treatment, as influenced by attachment, trauma, psychoneurobiology, and multicultural issues. Prerequisite: ArTh 224. (Fall)

228 **Psychopathology/Art and Diagnosis (3)** Tripp

Criteria of psychiatric diagnoses, such as the Diagnostic and Statistical Manual multiaxial system, theories of psychopathology, and relevant literature. Evaluation of potential indicators of functional and organic disorders in behavior and artwork of clients. Ethical issues; cultural and environmental influences on diagnostic categorization. Basic introduction to psychopharmacology. (Spring)

230 **Social and Cultural Diversity (3)** Doby-Copeland

Consideration of stereotypes and biases that interfere with effective treatment of patients who are racially, ethnically, and otherwise diverse. The role of the art therapist in conflict resolution, advocacy, and social justice. Exploration of the

therapist's heritage, expectations, and values. Racial identity development; skills for multicultural counseling. (Summer)

231 **Human Development and Art Therapy (3)** Staff

Psychological and artistic development across the life span. Theories of personality development; cultural and environmental influences. Human behavior, including developmental crises, disability, exceptional behavior, and addictive behavior. (Fall)

240 **Ethics and Professionalism (3)** Di Maria

Professional identity and role of the art therapist; the ethical practice of art therapy, including familiarity with ethical standards of AATA and ATCB as well as ACA and related fields; credentialing and licensure; public policy and advocacy for patients and for the profession. (Spring)

275 **Group Process (3)** Tripp

Theoretical and experiential understanding of group art therapy and counseling methods and skills. Principles of group dynamics, therapeutic factors, member roles and behaviors, leadership styles and approaches, selection criteria, and short- and long-term group process. (Summer)

280 **Assessment Procedures (3)** Bardot

Instruments and procedures used in assessment of psychological health and psychopathology as manifested in artwork and art-making. Statistical concepts, including reliability and validity; selection and administration of the assessment tool; effects of developmental level and cultural factors; documentation of the assessment; and formulation of treatment goals. (Spring)

285 **Special Projects in Art Therapy** (arr.) Staff

Individual work based on research. Empirical, clinical, and library research may be undertaken, as well as the development of new procedures. Details to be worked out with each student. May be repeated for credit with advisor's approval. Open only to art therapy students. (Fall and spring)

289 **Special Topics** (1 to 3) Staff

Connections between art therapy and other disciplines; new developments in the field. May be repeated for credit with approval of advisor.

290 **Advanced Issues in Psychotherapy and Art Therapy** (1 to 3) Staff

Overview and application of one or more treatment models or theories to various mental and emotional disorders. Connections between the practice of art therapy and the techniques of other disciplines.

293 **Practicum in Art Therapy** (1 or 2) Staff

A total of 900 hours of clinical fieldwork in a professional setting. Supervised clinical experience with clients or patients in psychiatric, rehabilitation, and education settings with children, adolescents, and adults. On-site individual supervision by clinical instructors; on-campus group supervision by faculty. Open only to art therapy students.

295 **Culminating Project** (1) Staff

BIOCHEMISTRY AND MOLECULAR BIOLOGY

A.L. Goldstein (*Chair of the Department of Biochemistry and Molecular Biology*), V.W. Hu

(*Director of the Ph.D. program in biochemistry and molecular genetics*), M. Allard, M.

Badamchian, P.E. Berg, B. Bouscarel, K. Brown, A. Chiaramello, A.M. Colberg-Poley, R.

Donaldson, S.W. Fu, D. Goldman, E.P. Hoffman, D. Johnson, F. Kashanchi, A. Komarov, J.H. Kramer, A. Kumar, S. Ladisch, P.S. Latham, T. McCaffrey, I.T. Mak, C. Merrill, S.A. Moody, T. Moody, W.C. Nierman, F.P. Noonan, S.J. O'Brien, R.K. Packer, S.R. Patierno, M. Rojkind, M.C. Rose, C. Smith, Y. Su, J. Vanderhoek, G. Walker, W. Weglicki, J. Weiss

Master of Science in the field of biochemistry—Prerequisite: a bachelor's degree. The undergraduate program must have included the following courses, or equivalent: BiSc 13, 14; Chem 22, 151–52, 153–54; Phys 11, 12.

Required: the general requirements stated under Columbian College of Arts and Sciences, including Bioc 221–22, 224, 234, 254, and the Comprehensive Examination. Students may choose a 30-credit thesis option or a 36-credit nonthesis option.

Master of Science in the field of genomics and bioinformatics—This degree program is offered by Columbian College of Arts and Sciences in cooperation with the School of Medicine and Health Sciences and the School of Engineering and Applied Science. Required: the general requirements stated under Columbian College of Arts and Sciences, including the genomics and bioinformatics core of Bioc 221–22, 234, 235, 236, 237, 254, and CSci 144. A biological track requires 32 or 35 credits, depending upon whether the student chooses a thesis or nonthesis option; a computer science track requires 38 credits for both thesis and nonthesis options. Computer science course requirements vary according to the track chosen, and electives are chosen from lists of designated courses.

Doctor of Philosophy in the field of biochemistry and molecular genetics—Required: the general requirements stated under Columbian College of Arts and Sciences, including the biomedical sciences core curriculum, Bioc 225, 227, 236, 237, and the General Examination.

Research fields: endocrinology—thymosins, signaling pathways, eicosanoids; viral gene regulation; antiviral chemotherapy; immunology—immunochemistry, viral gene transactivation; lipids and membranes—essential fatty acids, membrane biochemistry, complex lipids, cholesterol; carcinogenesis, apoptosis; molecular biology of cancer—breast cancer, leukemia, homeobox genes; genomics and proteomics—vascular biology, gene array technology, atherosclerosis, HIV-1 and other human retroviruses, autism spectrum disorders.

221–22 **General Biochemistry (4–4)** Berg and Staff

A comprehensive course in general biochemistry for graduate students in biomedical sciences and undergraduate students in biology and chemistry. Prerequisite: Chem 152, 154. (Academic year)

224 **Biochemical Techniques Laboratory (3)** Vanderhoek

Common laboratory techniques used in life science laboratories to separate and characterize macromolecules, including chromatography, gel electrophoresis, immunoassays, spectroscopy, and centrifugation. Corequisite: Bioc 221. Laboratory fee. (Fall)

225 **Metabolism (4)** Staff

Metabolic pathways and integration of metabolic processes. Limited to Ph.D. students in the Institute for Biomedical Sciences.

227 **Biochemistry Seminar (1)** Hu and Staff

Current literature in biochemistry. Limited to graduate students in the department. May be repeated for credit. (Fall and spring)

234 **Structure and Function of Proteins and Enzymes (3)** Hu and Staff

- Structure–function relationships of proteins, enzyme kinetics, regulation and reaction mechanisms, and other special topics. Prerequisite: Bioc 221. (Spring)
- 235 **Seminar in Genomics, Proteomics, and Bioinformatics (1)** Kashanchi and Staff
- 236 **Fundamentals of Genomics (2 or 3)** McCaffrey and Staff
- Viral, bacterial, yeast, and mammalian genomics and proteomics. Genomic theories, methods, and data analysis including bioinformatics and database mining. Same as Micr 236. Prerequisite or corequisite: Bioc 221–22 or BmSc 210, 211.
- 237 **Fundamentals of Proteomics (2 or 3)** Kashanchi and Staff
- Proteomic methods, including two-dimensional gels, image analysis, and protein identification. Same as Micr 237. Prerequisite: Bioc/Micr 236.
- 238 **Experimental Genomics Lab (2)** Fu, Kashanchi, McCaffrey
- Research applications of knowledge in genomics and proteomics. Prerequisite: Bioc 236. Laboratory fee.
- 239 **Applied Bioinformatics (2)** Su and Staff
- A broad overview of methods and applications of bioinformatics in the life sciences. Prerequisite: Bioc 221–22 or BmSc 210, 211.
- 250 **Molecular Biology (3)** Kumar and Staff
- Content includes the organization and replication of genetic material, transcriptional and translational machinery, regulation of eukaryotic gene expression, and other special topics. Prerequisite: Bioc 201 or 221–22. (Fall)
- 254 **Fundamentals of Molecular Biology (3)** Berg and Staff

- An intermediate-level molecular biology survey course. Prerequisite: Bioc 221 or BmSc 211.
- 256 **Molecular Genetics of Inherited Diseases** (2) Hoffman and Staff
- Biochemical aspects of genetics and contributions of molecular biology to understanding of human mutations and hereditary diseases. Prerequisite: degree candidacy or permission of program director. (Spring)
- 260 **Biotechnology of Lipids and Membranes** (2) Vanderhoek
- Basic techniques in the biotechnology of lipids and membranes. Prerequisite: Bioc 221. (Spring, even years)
- 281 **Topics** (1 or 2) Goldstein and Staff
- Directed readings in biochemistry, molecular biology, and genetics. May be repeated for credit. Enrollment limited to graduate students in the department.
- 295 **Research** (arr.) Staff
- Participation in a project under investigation in the department or one in a related field suggested by the student and approved by the staff. Content differs each time course is offered; may be repeated for credit. Laboratory fee. (Fall and spring)
- 298 **Advanced Reading** (1 to 6) Staff
- Limited to master's degree candidates. May be repeated for credit to a maximum of 6 hours.
- 299–300 **Thesis Research** (3–3) Staff
- 398 **Advanced Reading and Research** (arr.) Staff
- Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.

399 **Dissertation Research** (arr.)

Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit.

BIOLOGICAL SCIENCES

Professors R.K. Packer, R. Donaldson, J.R. Burns, D.L. Lipscomb (*Chair*), K.M. Brown, J.M.

Clark, L.C. Smith, G. Hormiga

Associate Professors H. Merchant, D.E. Johnson, E.F. Wells, R.P. Tollo, C.A. Forster, P.

Hernandez, J.T. Lill

Assistant Professors D.W. Morris, S.A. Church, A. Jeremic, H.G. Dobel

Master of Science in the field of biological sciences—Prerequisite: a bachelor's degree with a major in biological sciences or an equivalent degree: The undergraduate program must have included a course in statistics.

Required: the general requirements stated under Columbian College of Arts and Sciences. The minimum requirement consists of 24 credit hours of approved course work plus a thesis (equivalent to 6 credits). With the permission of the department, a student may elect a program of study consisting of 36 credit hours of approved course work without a thesis. All students must pass a Master's Comprehensive Exam.

Doctor of Philosophy in the field of biological sciences—Required: the general requirements stated under Columbian College of Arts and Sciences, prerequisites listed with the Master of Science, above, plus satisfactory completion of the General Examination in at least three areas of biological sciences. The program of study and fields of study are determined in consultation with an advisory committee appointed for each candidate.

Major research areas: cell, molecular, and developmental biology; systematics, evolution, and ecology.

With permission, a limited number of 100-level courses in the department may be taken for graduate credit; additional course work is required. See the Undergraduate Programs Bulletin for course listings.

204 **Seminar: Invertebrate Zoology (3)** Staff

Review of selected topics in physiology, development, and ecology of invertebrate animals, including reports on original publications. May be repeated for credit.

Prerequisite: BiSc 130 or equivalent. (Fall, even years)

206 **Current Topics in Evolutionary Ecology (1 or 2)** Church, Lill

May be repeated for credit.

207 **Seminar: Current Topics in Systematic Biology (1 or 2)** Clark,
Hormiga, Lipscomb

Prerequisite: BiSc 210. (Fall and spring)

208 **Bioenergetics (3 or 4)** Merchant

Study of energy fixation and transfer in ecosystems and of their role in behavior, evolution, population dynamics, and species interactions. Students enrolling for 4 credits will devote one additional class meeting per week to an investigation of the nature and methods of science. Prerequisite: BiSc 154 or permission of the instructor. (Fall, odd years)

209 **Seminar: Principles and Mechanisms of Organic Evolution (3)** Lipscomb

Current problems and issues in evolution; speciation, macroevolution, biogeography, and topics of special interest to participants. Prerequisite: BiSc 150 or equivalent. (Spring)

210 **Phylogenetic Systematics (4)** Hormiga

- A rigorous and up-to-date treatment of the theory and methods of systematics, including phylogenetic inference and its applications in evolutionary biology. Laboratory fee. Prerequisite: BiSc 150 or equivalent. (Fall)
- 211 **Biogeography and Coevolution (3)** Staff
- Survey of methods and techniques used in biogeography. Geological and paleontological aspects of biogeography; large-scale biogeographic patterns; coevolution. Prerequisite: BiSc 151 or 152 or permission of the instructor. (Fall, odd years)
- 213 **Descriptive Systematics: Documenting Biodiversity (3)** Hormiga
- Study of those aspects of systematic biology concerned with description and inventory of biodiversity. Prerequisite: BiSc 210. (Fall, odd years)
- 214 **The Phylogenetic Basis of Comparative Biology (3)** Hormiga
- The use of phylogenetic hypotheses to study questions in evolutionary biology and ecology. Prerequisite: BiSc 210; Stat 127 or equivalent. (Fall, even years)
- 215 **Vertebrate Phylogeny (4)** Clark
- Lecture (3 hours), laboratory and field (2 hours). A survey of vertebrate diversity, emphasizing evolutionary relationships and adaptations of the major groups. Prerequisite: BiSc 150 or equivalent; BiSc 132 recommended. (Spring, odd years)
- 216 **Morphological Systematics (4)** Clark
- Lecture (3 hours) and laboratory (2 hours). Methods of studying organismal morphology as a means of inferring phylogeny, emphasizing the concept of homology. Laboratory includes techniques of observing, measuring, and imaging

morphology in systematic biology, including morphometric methods. Laboratory fee.

Prerequisite: BiSc 210 or equivalent. (Spring)

218 **Innate Immunity** (3) Smith

Defense functions in higher plants and immune mechanisms in sponges through lower vertebrates, with comparisons to immune responses in mammals. Prerequisite: BiSc 102; recommended: BiSc 112. (Spring)

222 **Diversity and History of Plants** (4) Staff

Lecture (3 hours), laboratory (3 hours). A detailed investigation of the diversity, phylogeny, morphology, and fossil history of plants for advanced undergraduates and graduate students. Prerequisite: BiSc 140 or 150 or 151 or equivalent. (Fall, even years)

223 **Angiosperm Diversity and Phylogeny** (4) Staff

Lecture (2 hours) and laboratory (2 hours scheduled, 2 hours independent). A detailed investigation of the diversity and phylogeny of flowering plants. Lectures focus on morphological, anatomical, and molecular evidence for relationships within angiosperms. Laboratories focus on structural characteristics of families and higher groups. (Fall, odd years)

225 **Molecular Phylogenetics** (4) Staff

Lecture (3 hours), computer laboratory (2 hours). Review of molecular phylogenetic methods including data recovery, alignment, weighting, character optimization, and phylogenetic inference methods. Laboratory fee. Prerequisite: BiSc 107, 150, and 210 or equivalent. (Spring)

227 **Seminar: Genetics** (3) Johnson

- Review of selected topics in genetics, with emphasis on current literature; topics of special interest to participants encouraged. May be repeated for credit. Prerequisite: BiSc 107 or equivalent. (Fall, odd years)
- 228 **Population Genetics** (3) Johnson
Origin, maintenance, and possible significance of genetic variation in populations. Selection, genetic drift, microevolution of species, and speciation are emphasized. Both theoretical and applied aspects of population genetics are discussed. Prerequisite: BiSc 107 or equivalent. (Fall)
- 230 **Human Genetics** (3) Staff
Genetic mechanisms of transmission and expression of human traits, with emphasis on biochemical and cytogenetic aspects. Prerequisite: BiSc 107 or equivalent; previous course work in cell biology or cell biochemistry strongly recommended. (Spring)
- 242 **Advanced Plant Ecology** (3) Wells
Study of selected topics in adaptive plant strategies and North American plant communities, concentrating on invasive alien plant species. May be repeated for credit. Prerequisite: BiSc 155 or 158. (Spring)
- 243 **Seminar: Ecology** (3) Merchant
In-depth study of selected topics, including reports on original publications. May be repeated for credit. Prerequisite: BiSc 154 or equivalent. (Spring, even years)
- 249 **Seminar: Developmental Biology** (3) Brown, Hernandez

- Discussion and reports on recent research on the endocrinological, genetic, and biochemical aspects of animal development. Prerequisite: a course in developmental biology or cell biology. (Spring)
- 250 **Plant Signal Transduction (3)** Staff
Advanced topics of intra- and intercellular signaling; model signal transduction pathways. Prerequisite: BiSc 103 or Bioc 101 or Chem 163. (Spring, odd years)
- 251 **Evolutionary Developmental Biology (3)** Hernandez
Developmental mechanisms involved in the morphological changes that occur during the course of evolution. (Spring)
- 252 **Seminar: Neurobiology (3)** Staff
Study of current publications in functional neurobiology. May be repeated for credit with instructor's permission. (Spring, odd years)
- 274 **Gene Regulation and Genetic Engineering (3)** Morris
The control of gene expression as illustrated by several prokaryotic and eukaryotic model systems: discussions of recombinant DNA techniques. Prerequisite: BiSc 107. (Spring)
- 275 **Introduction to Recombinant DNA Techniques (3)** Staff
Lecture, 1 hour; laboratory, 4 hours. Basic techniques of genetic manipulation: cloning of genes, transformation of bacteria, PCR procedures, DNA sequencing, and other techniques. Prerequisite: BiSc 102 or 107 or 137 or equivalent and permission of instructor. Laboratory fee. (Fall, even years)
- 295 **Research (arr.)** Staff
Investigation of special problems. May be repeated for credit.

299–300 **Thesis Research (3–3)** Staff

398 **Advanced Reading and Research (arr.)** Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.

399 **Dissertation Research (arr.)** Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit.

BIOMEDICAL SCIENCES

Committee on Biomedical Sciences

L. Werling (*Director*), B. Bouscarel, A. Chiaramello, S. Constant, R.P. Donaldson, V. Gallo, R.A. Hawley, V. Hu, S. Ladisch, D. Leitenberg, D. Perry

The interdisciplinary doctoral programs in the biomedical sciences are organized within the Institute for Biomedical Sciences. The first full year of study toward the Ph.D. programs in the fields of biochemistry and molecular genetics, microbiology and immunology, and molecular medicine is offered through the Institute. Faculty are drawn from GW's Columbian College of Arts and Sciences and School of Medicine and Health Sciences, including scientists from the Children's Research Institute of Children's National Medical Center.

The biomedical sciences core curriculum consists of BmSc 210, 211, 212, and 216–18; and 3 credit hours of BmSc 215.

Students are admitted directly into the Institute for Biomedical Sciences through Columbian College of Arts and Sciences. At the end of the first year of study, each student selects one of the three Ph.D. fields and completes remaining degree requirements in the appropriate program. See Biochemistry and Molecular Biology (for the program in biochemistry and molecular genetics), Microbiology and Immunology, and Molecular Medicine.

210 Macromolecular Interactions: Proteins (2 or 4)

Proteins structure and function, introduction to metabolic processes. Registration with permission of instructor.

211 Macromolecular Interactions:

Nucleic Acids and Information Processing (2 or 4)

Structure and function of nucleic acids, organization of the genome, and regulation of protein synthesis and processing. Registration with permission of instructor.

212 Cell Biology (2 or 4)

Structure and functions of cells and tissues, techniques used for the analysis of cell function (image analysis, microscopy). Registration with permission of instructor.

215 Lab Rotations (1)

For Ph.D. students enrolled in the Institute for Biomedical Sciences. Laboratory training in advanced techniques in biomedical sciences research practices. May be repeated for credit.

216–18 Career Skills for the Biomedical Sciences (1–1–1)

Scientific writing, presentation skills, and seminar planning. Developing roles in the field: research in varying settings, policy and program planning, grants administration, and the biotechnology issues within intellectual property law. Ethical issues related to the conduct of research, animal use, and human subject participation. The design of a successful grant proposal.

BIOSTATISTICS

Columbian College of Arts and Sciences offers the degrees of Master of Science and Doctor of Philosophy in the field of biostatistics. The School of Public Health and Health Services

collaborates with the Department of Statistics and the Biostatistics Center in these degree programs. For the Public Health courses listed below, please contact the School of Public Health and Health Services.

Master of Science in the field of biostatistics—Prerequisite: course work in multivariate calculus, matrix theory, and multiple regression (Math 33 and 84 and Stat 118) and proficiency in computer applications (Stat 183 or PubH 251). With approval of the academic director, applicants who lack some of the listed prerequisite course work may be admitted to degree candidacy and fulfill deficiencies during the first year of study; such course work does not count toward degree requirements.

Required: The general requirements stated under Columbian College of Arts and Sciences. The program of study consists of 33 hours of course work, including Stat 201–2, 210, and 227; PubH 201, 202, 203, 209, 212, 258, 265, and 266. Elective courses are chosen from offerings of the Department of Statistics. A two-part Master's Comprehensive Examination is required.

Doctor of Philosophy in the field of biostatistics—Prerequisite: a master's degree in biostatistics or a closely related field, including the prerequisites listed under the Master of Science in the field of biostatistics. In some cases, an exceptionally well-prepared candidate may enter the program with a bachelor's degree.

Required: The general requirements stated under Columbian College of Arts and Sciences. Requirements include the courses for the Master of Science in the field of biostatistics, plus Stat 213, 226, and 263; PubH 221 and one course chosen from PubH 207 or another approved public health course. Electives are chosen from statistics and public health. At the end of the second year of study, a two-part General Examination is taken on probability and statistical inference and on biostatistics and epidemiology.

295 **Reading and Research** (arr.)

May be repeated for credit.

299–300 **Thesis Research** (3–3)

398 **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.

399 **Dissertation Research** (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit.

CHEMISTRY

Professors D. Ramaker, M. King (*Chair*), A. Montaser, J.H. Miller, A. Vertes

Associate Professors M.J. Wagner, C.L. Cahill, H.H. Teng, V. Sadtchenko

Assistant Professors M.G. Zysmilich, L.P. Eisen, C.S. Dowd, S. Gillmor

Master of Science in the field of chemistry—Prerequisite: a bachelor's degree with a major in chemistry from this University, or an equivalent degree.

Required: the general requirements stated under Columbian College of Arts and Sciences.

Course work must include a minimum of five 200-level courses; at least four of the courses must be core courses as defined in the department's Guide to Graduate Studies; at least three must be offered by the Chemistry Department. At least two 200-level courses must be taken outside the subdiscipline of the student and in at least two other subdisciplines/disciplines. Proficiency in computer programming must be demonstrated. Candidates are required to pass a Master's Comprehensive Examination.

Thesis option—30 credit hours of approved courses are required, including Chem 299–300, Thesis Research, which may be in analytical, inorganic, organic, or physical chemistry.

Nonthesis option—36 credit hours of approved courses are required, including Chem 295. Up to 9 credit hours in other departments related to the student's area of interest (e.g., Forensic Sciences) may be included in the program, subject to the approval of the Department of Chemistry. Students who are or will be employed in organizations dealing with science and technology policy programs may select from specified courses offered by Information Systems and Technology Management, Political Science, Public Policy and Public Administration, and the Elliott School of International Affairs.

Doctor of Philosophy in the field of chemistry—Required: the general requirements stated under Columbian College of Arts and Sciences. Students develop their program of studies in consultation with their doctoral committee, subject to the approval of the department's Graduate Affairs Committee. The program of studies must include course work in a minimum of five 200-level courses; at least four of the courses must be core courses as defined in the department's Guide to Graduate Studies; at least three must be offered by the Chemistry Department. These course requirements cannot be fulfilled by achievement on placement exams. At least two 200-level courses must be taken outside the subdiscipline of the student and in at least two other subdisciplines/disciplines. Equivalent courses offered by another university may be substituted at the discretion of the Graduate Affairs Committee. Students must pass a cumulative examination system and an oral defense of the doctoral research plan.

Research fields: analytical spectroscopy and separation; aqueous phase dynamics/chemistry; battery chemistry; biomedical analysis; chemical instrumentation; electrochemistry; elemental and isotopic analysis; heterocyclic chemistry; inorganic, organic, and solid state materials; laser-material interactions; mass spectrometry; membrane studies; mineral surface geochemistry; modeling and simulation; molecular spectroscopy; nanoscale and nanostructured materials;

organic synthesis/natural products; proteomics; small-molecule crystallography; solid state chemistry; structure and reactivity studies; surface chemistry; theoretical chemistry; trace analysis.

Ph.D. students in chemistry may substitute up to 12 hours of Dissertation Research in the form of course work jointly approved by the Chemistry Department and the Forensic Sciences Department or the International Science and Technology Policy program. The 12 hours may be selected from specified courses offered by Forensic Sciences, Information Systems and Technology Management, Political Science, Public Policy and Public Administration, and the Elliott School of International Affairs.

Note: All entering students in graduate chemistry programs are required to take the American Chemical Society Graduate Level Placement Examinations, given by the Department of Chemistry, prior to matriculation. The four placement examinations (in the disciplines of analytical, organic, inorganic, and physical chemistry) are designed to cover the subject matter in the disciplines generally taught in undergraduate programs preparatory for graduate work in chemistry, and the results are used by the department to advise the individual student in planning a program of courses appropriate to the student's background. All graduate students are required to participate in the seminar and colloquium programs. Upon consultation with course instructors, specific course prerequisites may be waived.

With permission, a limited number of 100-level courses in the department may be taken for graduate credit; additional course work is required. See the Undergraduate Programs Bulletin for course listings.

Quantum mechanics, approximate methods, electron spin, Pauli principle, atomic and molecular structure. Prerequisite: Chem 112. (Fall)

211–12 **Physical Chemistry** (1 to 3 each) Ramaker, Wagner, Miller

Same as Chem 111–12. Admission only by departmental permission. Credit assigned upon satisfactory completion of Chem 213. (Academic year)

213 **Chemical Thermodynamics** (3) Miller, Sadtchenko

Application of thermodynamics to chemical problems. Emphasis on statistical calculation of thermodynamic properties. Prerequisite: Chem 112 or 212. (Spring)

218 **Molecular Spectroscopy** (3) Miller and Staff

Applications of quantum mechanics and group theory to the interpretation of electronic, vibrational, rotational, and magnetic resonance spectroscopy. Prerequisite: Chem 207. (Spring, odd years)

220 **Selected Topics in Analytical Chemistry** (1 to 3) Staff

Advanced topics offered in a modular format to allow an in-depth examination of a self-selected field of analytical chemistry. One to three topics may be chosen for a given semester. May be repeated for credit.

221 **Spectrochemical Analysis** (3) Montaser

Theory and application of recent spectrometric methods of analysis, including advances in optimization techniques, optical instrumentation, atomic spectrometry, laser-based analytical techniques, X-ray methods, and surface analysis techniques. Prerequisite: Chem 122. (Fall)

222 **Ions: Wet and Dry** (3) Vertes

Principles, instrumentation, methods, and applications of mass spectrometry and electrochemistry; selected state-of-the-art methods demonstrate basic principles to show how new methods of analysis are developed; typical applications highlight solutions of biomedical and environmental problems. Prerequisite: Chem 122.

230 Selected Topics in Inorganic Chemistry (1 to 3) Staff

Advanced topics offered in a modular format to allow an in-depth examination of a self-selected field of inorganic chemistry. One to three topics may be chosen for a given semester. May be repeated for credit.

235–36 Advanced Inorganic Chemistry (3–3) Cahill

Application of modern chemical theories to inorganic substances and reactions; detailed study, developed from the periodic table, of the chemistry of the more common elements; electronic spectra and reaction mechanisms of complexes; organometallic chemistry; homogeneous and heterogeneous catalysis; bioinorganic chemistry. Prerequisite: Chem 112, 152.

238 Inorganic Materials Chemistry (3) Wagner

Synthesis, structure, and properties of materials such as ceramics, superconductors, ionic conductors, nanomaterials, and magnetic, optical, and electronic materials. Emphasis on traditional and low-temperature routes. Prerequisite: Chem 111–12. (Fall, even years)

240 Selected Topics in Physical Chemistry (1 to 3) Staff

Advanced topics offered in a modular format to allow an in-depth examination of a self-selected field of physical chemistry. One to three topics may be chosen for a given semester. May be repeated for credit.

250 **Selected Topics in Organic Chemistry** (1 to 3) Staff

Advanced topics offered in a modular format to allow an in-depth examination of a self-selected field in organic chemistry. One to three topics may be chosen for a given semester. May be repeated for credit.

251–52 **Advanced Organic Chemistry** (3–3) Staff

Synthesis, reactions, and properties of organic compounds; fundamental theories of organic chemistry, emphasis on reaction mechanisms. Prerequisite to Chem 251: Chem 112, 152. Prerequisite to Chem 252: Chem 251. (Academic year)

257 **Physical–Organic Chemistry** (3) Staff

The transition state theory of chemical kinetics, applications to reaction mechanisms; kinetic isotope effects, linear-free energy relationships, concentrated and “super” acids, Woodward–Hoffman rules, free radical reactions. Prerequisite: Chem 251 or permission of instructor. (Spring, odd years)

258 **Synthesis and Structure Determination in Organic Chemistry** (3) Staff

The design of syntheses for complex organic molecules; survey of modern synthetic methods, including asymmetric induction; spectroscopic methods of structure determination. Prerequisite: Chem 251 or permission of instructor.
(Fall, even years)

259 **Polymer Chemistry** (3) Staff

A study of the preparation, properties, and structure of macromolecules. Prerequisite: Chem 152 and 110 or 111 or permission of instructor. (Fall, odd years)

260 **Selected Topics** (1 to 3) Staff

Advanced topics offered in a modular format to allow an in-depth examination of a self-selected field in chemistry. One to three topics may be chosen for a given semester. May be repeated for credit.

295 **Research** (arr.) Staff

Limited to master's degree candidates. Survey of a topic approved by departmental staff and resulting in a written report and presentation of a seminar. Open to qualified students with advanced training. May be repeated for credit.

299–300 **Thesis Research** (3–3) Staff

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit.

CIVIL AND ENVIRONMENTAL ENGINEERING

Professors K. Mahmood, M.I. Haque, K.H. Digges (*Research*), A. Eskandarian, K. Roddis
(*Chair*), M.T. Manzari

Associate Professors V. Motevalli, R. Riffat, C.D. Kan (*Research*), P.F. Silva, S.S. Badie

Assistant Professor D. Marzougui (*Research*)

Professorial Lecturers B. Whang, M.O. Critchfield, C. Smith, G.C. Everstine

See the School of Engineering and Applied Science for programs leading to the master's, professional, and doctoral degrees.

201 **Numerical Methods in Engineering** (3) Eskandarian and Staff

- Eigenvalue problems. Numerical solution of systems of equations and ordinary differential equations. Solution techniques for elliptic, parabolic, and hyperbolic partial differential equations. Numerical methods for solving finite element equations. Introduction to solution of fluid-flow problems. Prerequisite: CE 117. (Fall)
- 202 **Application of Probability Methods in Civil Engineering (3)** Staff
- Uncertainty in real-world information; basic probability concepts and models; random variables; useful probability distributions, statistical estimation of distribution parameters from observed data; empirical determination of distribution models; testing hypothesis; regression and correlation analyses; decision theory. Prerequisite: ApSc 115. (Spring, even years)
- 205 **Advanced Strength of Materials (3)** Manzari and Staff
- Deflection of beams using singular functions, unsymmetrical bending of beams, beams on elastic foundation. Beam-column problems, shear center for thin-walled beam cross sections, curved beams. Applications of energy methods, torsion, basic equations for theory of elasticity, thin- and thick-walled cylinders, stress concentration, and failure criteria. Prerequisite: CE 120. (Spring)
- 206 **Design of Reinforced Concrete Structures (3)** Badie
- Structural behavior of reinforced concrete structures, ultimate strength and deformation characteristics; design of structural components including beams, columns, floor slabs, deep beams, corbels, and composite slab/beam systems. Prerequisite: CE 192. (Fall)
- 207 **Prestressed Concrete Structures (3)** Badie

Structural behavior and failure modes of prestressed concrete structures; design in prestressed concrete, including long-span structures, bridges, and precast systems.

Prerequisite: CE 192. (Spring)

208 **Advanced Reinforced Concrete Structures (3)** Badie

Conception, analysis, and design of low-rise and high-rise buildings by ultimate-strength methods, precast systems, progressive collapse, earthquake considerations, domes, folded plates, shell-type structures, and special topics. Prerequisite: CE 206.
(As arranged)

209 **Bridge Design (3)** Badie

Application of basic design procedures for reinforced and prestressed concrete bridges, according to AASHTO bridge specifications. Various types of concrete bridges, design superstructure bridge elements (deck slab, girders, bearing pads), and development of superstructure/substructure details. Prerequisite: CE 207.
(As arranged)

210 **Methods of Structural Analysis (3)** Badie

Modern methods of analysis of statically indeterminate structures, matrix analysis based on flexibility, stiffness, energy and variational methods, substructuring techniques; consideration of plastic collapse of structures; introduction to the finite element method. Prerequisite: CE 122. (Fall)

211 **Design of Metal Structures (3)** Roddis

Structural behavior of metal structures and composite girders. Conception, analysis, and design of low-rise and high-rise buildings by elastic and inelastic methods. Earthquake considerations and special topics. Prerequisite: CE 191. (Spring)

- 212 **Advanced Metal Structures (3)** Roddis and Staff
- Conception and design of advanced structural components and systems, hysteretic behavior, plastic design principles, box-type girders, cable systems, and unique structural systems. Prerequisite: CE 211. (As arranged)
- 213 **Reliability Analysis of Engineering Structures (3)** Haque and Staff
- Probability theory, theory of structural reliability, probabilistic analysis of strength and loads, risk and reliability function, empirical distribution, probability plot. The design service life, method of perturbation, Monte Carlo simulation. Fatigue and fracture, proof testing, inspection and repair–replacement maintenance. Prerequisite: ApSc 115. (Fall, odd years)
- 214 **Analysis of Plates and Shells (3)** Haque and Staff
- Bending and stretching of thin elastic plates under loading with various boundary conditions, continuous plates and plates on elastic foundations, theory of folded-plate structures. Theory of curved surfaces; general linear bending theory and its simplification to membrane theory; bending stresses in shells of revolution, shallow-shell theory. (Spring, odd years)
- 215 **Theory of Structural Stability (3)** Haque, Manzari
- General criteria for stability, buckling of elastic and inelastic columns and frames, torsional and lateral buckling, variational methods. Buckling of plates and shells under static loads, stability of stiffened structures, effect of imperfections and boundary conditions. (Fall)
- 216 **Structural Dynamics (3)** Manzari and Staff

- Vibration of continuous systems: membranes, beam plates, and shells; approximate methods of vibration analysis; methods of integral transform; analysis of nonlinear systems; wave propagation. Prerequisite: approval of department. (Fall, odd years)
- 217 **Random Vibration of Structures (3)** Staff
- Introduction to random processes, responses of linear structures to stationary and nonstationary random inputs. Structural responses to earthquakes, waves, boundary-layer turbulences, wind loads, etc. Failure analysis of structures under random loads. Prerequisite: MAE 257. (Spring, even years)
- 218 **Structural Design to Resist Natural Hazards (3)** Manzari and Staff
- Prediction of forces due to earthquakes and strong winds; generalized codes; pseudostatic methods for preliminary design; codes based on spectra, energy absorption and ductility; influence of foundations; ground failures; static and aeroelastic effects of strong winds. Design project. Prerequisite: CE 122, 196. (Spring)
- 220 **Continuum Mechanics (3)** Manzari and Staff
- Introduction to the mechanics of continuous media. Tensor calculus; kinematics; stress and stress rate, conservation of mass, conservation of linear and angular momentum, energy balance, second law of thermodynamics; constitutive theory; linear and nonlinear elasticity, newtonian fluids, micropolar elasticity. (Fall, even years)
- 221 **Theory of Elasticity (3)** Manzari, Lee
- Introduction to Cartesian tensors; deformation, stress, constitutive relations for linear elasticity; formulation of boundary value problems, variational principles, torsion and

- bending of prismatic rods, plane problems. Same as MAE 207. Prerequisite: approval of department. (Spring)
- 222 **Plasticity** (3) Manzari and Staff
- Introduction to the continuum theory of plastic deformation. Physical basis of rate-independent plasticity. Concepts of yield, strain hardening and softening, reverse yield, and cyclic plasticity. Constitutive equations describing plastic deformation. Prerequisite: CE 205 or 220. (Spring, odd years)
- 223 **Mechanics of Composite Materials** (3) Manzari and Staff
- Stress-strain relationship for orthotropic materials, invariant properties of an orthotropic lamina, biaxial strength theory for an orthotropic lamina. Mechanics of materials approach to stiffness, elasticity approach to stiffness. Classical lamination theory, strength of laminates. Statistical theory of fatigue damage. Same as MAE 233. Prerequisite: CE 122. (Spring, odd years)
- 225 **Introduction to Biomechanics** (3) Eskandarian, Kan
- Fundamentals of continuum mechanics as they apply to biological materials: concepts of stress, strain, and equilibrium; elastic and viscoelastic properties of solids; physiological fluid mechanics and bioheat and mass transfer. Fundamentals of solid mechanics of soft tissues and bone structures. Development of computer models and applications. Prerequisite: CE 120. (Spring)
- 226 **Advanced Biomechanics** (3) Staff
- Historical overview of biomechanics and biomaterials. Fundamental concepts in mechanics as applied to the treatment of biological systems. Approaches to the mechanical analysis of the human structure under physiological and non-

- physiological loading conditions. Constitutive laws for biological materials. Finite element applications. Prerequisite: CE 220 or 225. (As arranged)
- 227 **Introduction to Finite Element Analysis (3)** Haque
Calculus of variations. Variational formulation of the finite element method. Weighted residual techniques. Computer implementation of the finite element method. Application to problems in heat transfer, stress analysis, fluid flow, and structural analysis. Prerequisite: proficiency in one computer language. (Fall)
- 228 **Advanced Finite Element Analysis (3)** Manzari, Lee
Review of variational formulation of the finite element method. Formulation of various continuum and structural elements. Application to static and dynamic problems in elasticity, plasticity, large deflection, and instability in plates and shells. Recent developments in finite element methods. Same as MAE 288. Prerequisite: CE 220, 227; or MAE 210, 286. (Spring, odd years)
- 230 **Fundamentals of Soil Behavior (3)** Manzari and Staff
Soil mineralogy, clay–water–electrolyte systems, soil composition, fabric, structure, volume change behavior, permeability, coupled phenomena, in-situ evaluation of soil behavior. Prerequisite: CE 168. (Fall, even years)
- 231 **Theoretical Soil Mechanics (3)** Manzari and Staff
Porous media, stress–strain behavior of soil skeleton, elastic and elastoplastic models for soil behavior, critical state concept, cam clay, strength of soils, stress–dilatancy, stress paths. (Fall, odd years)
- 232 **Geotechnical Engineering (3)** Manzari and Staff

- Principles of soil mechanics applied to the analysis and design of mat foundations, pile foundations, retaining structures including sheeting and bracing systems, and waterfront structures. Foundations on difficult soils and reinforced earth structures. Prerequisite: CE 168. (Spring)
- 233 **Geotechnical Earthquake Engineering (3)** Manzari and Staff
Ground motion, wave propagation, foundation isolation, site response analysis, seismic stability of retaining structures, soil structure interaction. Prerequisite: graduate standing. (As arranged)
- 234 **Rock Engineering (3)** Manzari and Staff
Classification and properties of rock; nature of rock masses and rock discontinuities; field exploration; methods of excavation; design and applications to foundation slopes, tunnels, and chambers in rock. Prerequisite: CE 168. (As arranged)
- 240 **Environmental Chemistry (3)** Riffat and Staff
Principles of chemistry of natural waters, water supplies, wastewaters, hazardous wastes. Stoichiometry, equilibrium, solubility, kinetics, organic chemistry, biochemistry, analytical techniques. Examples from water/wastewater practice to illustrate applications. (Fall)
- 241 **Advanced Sanitary Engineering Design (3)** Riffat and Staff
Elements of design including basic parameters and hydraulic requirements. Layout and design of water supply and wastewater systems, pumping stations, and treatment plants. Plant expansions and modifications. Prerequisite: CE 197. (Spring)
- 242 **Principles of Environmental Engineering (3)** Riffat and Staff

- Basic concepts of water, air, and terrestrial environments and interrelationships among them. Principles of environmental chemistry and microbiology. Assessment of environmental quality and impacts. Environment and health. Water and wastewater systems. Legal and regulatory controls. (Fall)
- 243 **Water and Wastewater Treatment Processes (3)** Riffat and Staff
Theory and application of commonly used processes. Sedimentation, coagulation, filtration, disinfection, gas transfer, activated sludge, trickling filters, oxidation ponds, sorption, and sludge stabilization and disposal. Process combinations to produce treatment systems. Prerequisite: CE 242. (Spring)
- 244 **Environmental Impact Assessment (3)** Riffat and Staff
Public policy and legislation on environmental quality. Methods for assessing impacts of engineering projects. Technology for assessing impacts on air, water, and land environments, applied to transportation facilities, water and wastewater facilities, industrial and community development. (Fall)
- 245 **Microbiology for Environmental Engineers (3)** Riffat and Staff
Principles of microbiology and applications to lakes, streams, hazardous wastes, and biological treatment systems. Methods for evaluating impacts of wastewaters and hazardous wastes on ecological systems. Concepts of limnology, including limiting of nutrients and control of nuisance growths. (Spring, even years)
- 246 **Advanced Treatment Processes (3)** Riffat and Staff
Principles and applications of advanced treatment systems for water, wastewater, and hazardous wastes, including: biological nutrient removal, oxidation-reduction

processes, stripping, sorption, membrane processes, chemical precipitation, others.

Prerequisite: CE 243. (Fall, even years)

247 **Industrial Waste Treatment (3)** Riffat and Staff

Types of industries, waste sources. Characteristics, measurements, and evaluation.

Minimization and reuse. Treatment process selection, development, and design.

Regulations, permits, standards, monitoring, and pretreatment. (Fall)

248 **Introduction to Hazardous Wastes (3)** Riffat and Staff

Regulations, including RCRA and Superfund. Transport and fate of hazardous substances. Elements of environmental toxicology, risk assessment, and hazard ranking. Monitoring, data collection, and evaluation. Waste minimization. Case histories. (Spring)

250 **Open Channel Flow (3)** Mahmood and Staff

Types and regimes of flow; energy and momentum principles, uniform flow, gradually varied flow, spatially and rapidly varied flow. Flow in nonprismatic channels. Unsteady flow; dam break problem, flood routing. Prerequisite: CE 193 or equivalent. (Fall)

251 **Hydraulic Engineering (3)** Haque and Staff

Hydraulic design of conveyance, regulating, and measurement structures. Design for spillways, energy dissipators, inlet and outlet works related to dams. Forces on hydraulic structure and stability analysis. Hydraulic turbines and pumps. Design considerations for flow through pipes. Transients and cavitation. Prerequisite: CE 193. (As arranged)

252 **Design of Dams (3)** Mahmood and Staff

- Project planning and investigations. Types of dams; design of earth–rock fill dams; stability analysis, foundation treatment, wind–wave protection. Construction methods for dams. Reservoir sedimentation. Safety inspection of dams. Prerequisite: CE 193. (Spring, even years)
- 253 **Advanced Hydrology (3)** Mahmood and Staff
- Precipitation, evaporation, and transpiration. Soil physics; stream flow, drainage basins, hydrograph analysis, and stream-flow routing. Design criteria, flood frequency statistics and analysis, flood forecasting and control, water-supply forecasting. Prerequisite: CE 195. (Spring, even years)
- 254 **Groundwater and Seepage (3)** Haque and Staff
- Permeability theory of groundwater flow, flow nets, analogs, computer solutions; applications to engineering problems such as excavation dewatering, flow through dams, stabilization of earth slopes. Prerequisite: approval of department. (Spring)
- 255 **Mechanics of Water Waves (3)** Haque
- Irrotational theory for deep- and shallow-water waves, reflexion, refraction, diffraction, attenuation. Water waves of finite amplitude: shallow-water theory, tides, bores, long-waves theory, conoidal and solitary waves. Wave generation by wind. Wave breaking and reflexion. Prerequisite: ApSc 213 and permission of instructor. (As arranged)
- 256 **Water Resources Planning and Control (3)** Mahmood and Staff
- The parameters of water resources planning and control, economics of water resources and related natural resources, economics of water-quality control, physical

parameters of water resource development, water resources law. Prerequisite:
approval of department. (Fall, even years)

257 **Hydraulic Modeling (3)** Mahmood and Staff

Dimensional analysis and similitude. Types of models—physical, mathematical.
Distortions in physical models. Erodible bed models. Prerequisite: CE 193.
(Fall, even years)

258 **Numerical Methods in Environmental
and Water Resources (3)** Mahmood and Staff

Use of microcomputers in water resources. Elements of finite difference schemes,
basic operations, convergence, stability, and consistency. Nonuniform flow and error
analysis; unsteady laminar flow; diffusion problems; unsteady flow in open channels;
water hammer, seepage flow, and diffusion–dispersion problems. Prerequisite:
approval of department. (Spring)

259 **Pollution Transport System (3)** Mahmood and Staff

Distribution of pollutants in natural waters and atmosphere, diffusive and advective
transport, mathematics for stream pollutant deoxygenation rates, groundwater
pollution transport, sediment transport, thermal transport, numerical simulation of
pollutant transports in streams and estuaries. Prerequisite: CE 193, MAE 131.
(Fall, even years)

260 **Analytical Mechanics (3)** Eskandarian and Staff

Fundamental principles, particle and rigid-body dynamics, generalized coordinates,
variational principles and Lagrange's equations, nonholonomic systems, Hamilton's
equations, theory of small oscillations. (Fall)

- 261 **Vehicle Dynamics (3)** Eskandarian and Staff
- Engineering principles and analytical methods explaining the performance of an automotive vehicle. Basic mechanics governing vehicle dynamic performance in longitudinal, ride, and handling modes. Engineering analysis techniques applied to basic systems and subsystems to derive the governing equations. Prerequisite or corequisite: CE 260. (Spring, even years)
- 262 **Vehicle Standards and Crash Test Analysis (3)** Digges and Staff
- Safety mandates and comparison of motor vehicles based on U.S. and European safety standards. Characteristics of dummies and mechanical devices specified for crash testing. U.S. national accident and injury data; calculation of benefits of safety measures. (Fall)
- 263 **Crash Investigation and Analysis (3)** Digges and Staff
- Crash reconstruction methods for systematic investigation of vehicle crashes. Analysis of vehicle safety systems and their effectiveness; computer simulation and analysis of crash data; sensitivity of analytical techniques; case investigations. (Spring)
- 264 **Nonlinear Finite Element Modeling and Simulation (3)** Eskandarian and Staff
- Rigid and flexible body methods for modeling crashes. Application of dynamic nonlinear finite element methods with contact algorithms for modeling crash phenomena. Modeling and simulation of vehicles, airbags, safety restraining systems, and highway barriers. (Spring)
- 269 **Pavement and Runway Design (3)** Manzari and Staff

- Pavement types, wheel-load characteristics; stresses in pavements and subgrades; empirical methods of design of flexible and rigid highway and airfield pavements; general principles of runway design. (Spring, odd years)
- 270 **Systems Dynamics Modeling and Control (3)** Eskandarian and Staff
Introduction of concepts in control theory and applications to solve problems in civil and transportation engineering dealing with single-input/single-output and multi-input/multi-output systems. Review of classical control theory in the frequency and time domain, state-space analysis, system optimization, and non-linear control. (Fall)
- 272 **Traffic Engineering and Highway Safety (3)** Eskandarian and Staff
Roadway traffic capacity and network performance measures; steady and unsteady traffic flow phenomena; traffic control signalization theory and practical implementation; monitoring techniques, instruments, and data processing for highway safety. Traffic related highway safety design concepts. (Fall)
- 273 **Intelligent Transportation Systems (3)** Eskandarian
Commands, controls and communications in modern multimodal transportation; infrastructure/highway and vehicle automation, advanced traffic management, vehicle control and safety systems; information, data, and sensory requirements; practical applications and projects. (Spring)
- 290 **Special Topics (1 to 6)** Staff
Topic to be announced in the Schedule of Classes.
- 291 **Civil and Environmental Engineering Graduate Internship (1)** Staff

For graduate students in the department. May be repeated once for credit.

Prerequisite: required courses in the area of focus and department approval.

Additional prerequisites may be required for a specific internship as determined by the research supervisor.

298 **Research (arr.)** Staff

Basic research projects, as arranged. May be repeated for credit.

299–300 **Thesis Research (3–3)** Staff

320 **Theory of Elasticity II (3)** Lee, Manzari

Application of integral transform and analytic function theory to solution of plane problems; elastic wave propagation. Three-dimensional elasto-statics. Prerequisite: ApSc 211; CE 221. (Fall, odd years)

321 **Nonlinear Mechanics of Continua (3)** Lee, Manzari

Polar decomposition, invariance, isotropy, representation theorems for invariants and isotropic tensor functions. Deformation, kinematics, stress, balance principles. Principles for constitutive relations. Applications to nonlinear elasticity and non-Newtonian fluids. Prerequisite: CE 220. (Spring, even years)

350 **Sedimentation Engineering (3)** Mahmood

Problems of erosion and sedimentation. Properties of sediment. Initiation of motion. Suspension of sediment and sediment discharge theories. Sedimentation measurements. Economic and legal aspects. Prerequisite: CE 250 or approval of department. (Fall, odd years)

351 **Mechanics of Alluvial Channels (3)** Mahmood

- Physical processes in drainage basins and channels. Channel forms and bed forms. Hydraulics and sediment transport in alluvial channels. Design of stable channels. Qualitative and quantitative response of rivers. Channel stabilization, navigation channels. Case studies including environmental impacts. Prerequisite: CE 250 or approval of department. (Fall, even years)
- 352 **Advanced Hydraulics (3)** Mahmood
Theory of unsteady flow. Diffusion and dispersion through pipes and open channels. Numerical solutions using finite element and finite difference methods. Prerequisite: CE 250 or approval of department. (Spring, even years)
- 370 **Intelligent Systems Theory and Applications (3)** Eskandarian
Overview of artificial intelligence, neural networks, genetic algorithms, fuzzy systems, and hybrid intelligent systems and their integration with other information processing methods. Intelligent systems applications; examples are drawn from ITS and traffic engineering, vehicle safety, remote sensing, and structural design optimization. Prerequisite: CE 270. (As arranged)
- 398 **Advanced Reading and Research (arr.)** Staff
Limited to students preparing for the Doctor of Philosophy qualifying examination. May be repeated for credit.
- 399 **Dissertation Research (arr.)** Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit.

COMPUTER SCIENCE

Professors S.Y. Berkovich, P.S. Bock, J.L. Sibert, R.S. Heller, C.D. Martin, H.-A. Choi, A. Youssef (*Chair*), B. Narahari, J.K. Hahn, R. Simha, R. Price Jones

Associate Professors S. Rotenstreich, A. Bellaachia, X. Cheng

Assistant Professors P. Vora, M. Burke, N. Zhang

Professorial Lecturers D.C. Roberts, T. Hanson, N. Brenner, G.J. Kowalski, S.H. Kaisler, M.

Happel, A. Panchenko, R.A. Fernandez, M. Lancaster, G. Blankenship, D. Christian, S.

Delahunty, D. Eisenreich, T. Grissom, A. Hennings, M. Pinkerton

See the School of Engineering and Applied Science for programs leading to the master's, professional, and doctoral degrees. A certificate program in computer security and information assurance is offered by the Department of Computer Science.

Note: Consult the department about graduate courses listed here that may not be taken for credit if equivalent undergraduate courses have been taken for credit.

207 Scientific Databases and Knowledge Formation (3) Berkovich and Staff

Database management and information retrieval. Relational algebra and SQL query language. Advanced retrieval capabilities. Data mining. Rules of inductive inference. Classification, clustering, and machine learning techniques. Confronting the problems of complexity. Prerequisite: CSci 123 and either CSci 103 or 133. (Spring)

210 Advanced Software Paradigms (3) Bellaachia and Staff

Object-oriented, procedural, functional, and concurrent software design paradigms; design patterns; software life-cycle concepts. Tradeoffs between compiled and interpreted languages. Examples from Ada, Java, C, C++, and Perl. Prerequisite: CSci 123, 133. (Fall and spring)

211 Computer Architectures (3) Narahari and Staff

Concepts in processor, system, and network architectures; architecture of pipeline, superscalar, and VLIW/EPIC processors; multiprocessors and interconnection

networks. Cache coherence and memory subsystem design for multiprocessor architectures. Parallel and distributed system architecture; internetworking.

Prerequisite: CSci 123, 133, 135. (Fall and spring)

212 **Design and Analysis of Algorithms (3)** Youssef and Staff

Design and analysis of algorithms. Turing machines; NP-Complete theory.

Algorithmic techniques: divide-and-conquer, greedy, dynamic programming, graph traversal, backtracking, and branch-and-bound. Applications include sorting and searching, graph algorithms, and optimization. Prerequisite: CSci 123, 133.

(Fall and spring)

220 **Theory of Computation (3)** Narahari and Staff

Theoretical foundations of computer science. Formal languages and automata; regular expressions, context-free languages, parsing; Turing machines and complexity; partial recursive functions; undecidability; program correctness; fixed-point theory; formal specifications of software. Prerequisite: CSci 210, 212. (Spring)

221 **Advanced Data Structures (3)** Berkovich and Staff

Sparse matrix transpose and multiplication. List insertion and deletion, lists of available space. In-order, preorder, and postorder traversal of trees. Topological sorting. Binary search trees, including AVL trees, B-trees, and tries. Dynamic hashing. Prerequisite: CSci 212. (Spring)

223 **Graph Theory and Applications (3)** Choi and Staff

Undirected and directed graphs. Connectivity, partitions, cycles and matchings. Edge and vertex coloring, chromatic polynomials, and the four-coloring problem. Planar

- graphs and Kuratowski's theorem. Properties of random graphs. Applications to a variety of problems. Prerequisite: CSci 212. (Spring, even years)
- 224 **Advanced Discrete Structures (3)** Youssef and Staff
- Discrete techniques in computer science. Algebraic structures, vector spaces, linear transforms, norms, matrices, complex numbers, convolution and polynomial multiplication, Fourier analysis, discrete Fourier transform, number theory. Applications to computer security, coding theory, and audiovisual signal processing. Prerequisites: CSci 123 and Math 32. (Fall)
- 225 **Data Compression (3)** Youssef and Staff
- Background on signals, information theory, transforms, human vision, and metrics. Lossless and lossy compression techniques. Video compression. Compression standards. Progressive transmission. Prerequisite: CSci 212. (Fall)
- 226 **Computational Biology Algorithms (3)** Price Jones and Staff
- Algorithms and models for DNA and protein sequence alignments, gene finding, identification of gene regulatory regions, sequence evolution and phylogenetics, RNA and protein structure, microarray and/or proteomics data analysis. Prerequisite: CSci 212 or equivalent; programming experience in C/CC+ or Java. (Spring)
- 227 **Numerical Solutions of Algebraic Systems (3)** Berkovich and Staff
- Numerical solutions of linear algebraic equations and the algebraic eigenvalue problem. Sparse matrix techniques. Solutions of nonlinear simultaneous equations. Interpolation and extrapolation. Prerequisite: CSci 212. (Fall, even years)
- 228 **Complex Systems (3)** Simha and Staff

- The edge-of-chaos phenomenon, phase transitions, power laws, small-world networks, Boolean networks, cellular automata, and complex dynamics. Applications to networks and biological systems. Prerequisite: CSci 212. (On demand)
- 229 **Computing Technology in Justice and Public Safety** (3) Youssef and Staff
Issues, needs, and state of the art of information technology in justice and public safety; information sharing, integration, interoperability; XML, GJXDM (justice data model), and NIEM; web services; service-oriented architecture; communications issues; security and privacy aspects. (Fall and spring)
- 232 **Computer Networks** (3) Cheng and Staff
Fundamental concepts in the design and implementation of computer communication networks and internet, their protocols, and applications. Layered network architectures, applications, network programming interfaces, transport, routing, data link protocols, local area networks, network management, and network security. Prerequisite: CSci 211. (Fall)
- 233 **Internet Protocols** (3) Staff
Understanding of the layered protocols for the Internet. Interconnection of networks. The IP protocol and routing algorithms, switches, bridges, and routers. The transmission control protocol (TCP). Addressing and names. Application-specific protocols, FTP, TELNET, SMTP, SNMP, HTTP. Domain name services. Prerequisite: CSci 210, 232. (Fall)
- 234 **Design of Internet Protocols** (3) Staff

- Protocol specifications and formal description methods. Finite-state descriptions of Internet protocols. Specification and Description Language. Implementation of protocol specifications. Prerequisite: CSci 212, 233.
- 235 **Distributed and Cluster Computing (3)** Staff
- Overview of network programming. Interconnection networks and system architecture for clusters. Cluster design, benchmarking, management, and configuration. Distributed computing on the web and grids. Distributed naming, location, authentication, and high availability. Programming high-performance clusters. Prerequisite: CSci 211. (Fall, odd years)
- 238 **Computer System Performance (3)** Narahari and Staff
- Queuing models of computer systems and applications of queuing theory to computer modeling. Bounds on system performance. Mean-value analysis of computer systems. Modeling specific subsystems. Queuing models for analysis. Limitations of queuing models. Analysis of transaction processors and terminal-oriented systems. Prerequisite: CSci 211. (Fall, odd years)
- 239 **Comparative Computer Systems (3)** Youssef and Staff
- Structures of computers and a system description language. History, characteristics, and philosophies of different computer structures. Special-purpose processors, multiprocessors, networks, and time-shared systems. Comparison of computer families. Performance evaluation. Effects of software and technology on computer structures. Prerequisite: CSci 211. (Spring, odd years)
- 241 **Database Management Systems (3)** Narahari and Staff

- Design and architecture of relational database management systems; query languages, data models, index structures, database application design. Prerequisite: CSci 210, 211, or equivalent. (Fall)
- 242 **Database Systems (3)** Narahari and Staff
- Concepts in database systems. Relational database design. Editing, report generation, updating, schema refinement, tuning. Construction of database management systems. Conceptual and logical design of a database. Prerequisite: CSci 241. (Spring)
- 243 **Data Mining (3)** Bellaachia and Staff
- Fundamental concepts of data mining. Algorithm techniques for data mining, including classification, clustering, association rules mining. Prerequisite: CSci 241 or equivalent or permission of instructor. (Spring)
- 244 **Information Retrieval Systems (3)** Berkovich and Staff
- Information organization and retrieval of natural language data by digital computer systems; statistical, syntactic, and logical analysis of natural language; dictionary and thesaurus systems; searching strategies and cataloging. Large-scale file structures. Prerequisite: CSci 210, 211. (Spring)
- 246 **Compiler Optimization (3)** Narahari and Staff
- Overview of compilers, parsing techniques, code generation. Compiler optimization techniques, including register allocation, instruction scheduling. Compiler design for ILP processors. Prerequisite: CSci 210, 211, 212. (Fall, even years)
- 251 **Distributed Operating Systems (3)** Rotenstreich and Staff
- Architecture, concurrent processes, interprocess communication, distributed scheduling, distributed shared memory, distributed security, synchronization and

- elections, distributed agreement, transactions and replicated data. Prerequisite: CSci 210, 211, 212. (Fall)
- 252 **Component-Based Enterprise Software Development (3)** Rotenstreich and Staff
Component-based software development for enterprise applications. Component models, multi-tier architecture. Specific case studies may include topics such as Enterprise Java Beans, DCOM, and COBRA. Prerequisite: CSci 210. (Fall)
- 253 **Object-Oriented Design (3)** Rotenstreich and Staff
Object-oriented systems, software reusability, software modularity, top-down and bottom-up approaches, object classification, genericity, metaprogramming, concurrent object-oriented programming languages. Prerequisite: CSci 210. (Spring)
- 254 **Software Engineering (3)** Rotenstreich and Staff
The life-cycle model. Requirements and specifications. Design models, structured and object-oriented design. Program development, PDL's tools, configuration control. Program, unit, and integration testing. Program verification. Other development models. Development metrics. Computer-aided software engineering (CASE). Prerequisite: CSci 210, 212. (Spring)
- 255 **Software Engineering Development (3)** Rotenstreich and Staff
Formal methods in software engineering. First-order logic, basic specification elements, rigorous proofs, formal development process, concurrency. Prerequisite: CSci 211, 212. (Fall)
- 256 **Software Testing and Quality (3)** Rotenstreich and Staff

Flow graphs and path testing, transaction flow testing, data flow testing, software metrics, system testing, test planning and documentation, reliability, statistical testing.

Prerequisite: CSci 254. (Fall)

259 **Advanced Object-Oriented Programming (3)** Bellaachia and Staff

The design patterns of Gamma, Helm, Johnson, and Vlissides. The C++ Standard Template Library (STL), a generic programming paradigm that has been adapted to the C++ programming language, and is an extensible framework for generic and interoperable components. Prerequisite: CSci 210 or familiarity with C++, data structures, and object-oriented programming. (Spring)

260 **Design of Interactive Multimedia (3)** Heller and Staff

History, theory, and development of multimedia concepts. Hardware components, platforms, and authoring tools. Scientific, technical, and cognitive foundations of various media including text, sound, graphics, and video. Interface design. Use of a media taxonomy as a design and evaluation tool. Completion of a multimedia portfolio required. Prerequisite: CSci 210. (Fall)

261 **Design and Implementation of Educational Software (3)** Martin and Staff

History and types of computer-based learning (CBL). Models of learning theory and instructional design. Scripted and generative design strategies, use of authoring systems. Intelligent tutoring systems. Dissemination, legal issues. Overview of research issues in CBL. Project required. Prerequisite: CSci 260. (Spring)

262 **Computer Graphics Programming Tools (3)** Hahn and Staff

Standard graphics and animation programming tools and packages. Lab-specific software tools for sound, motion control, and rendering. Hardware used for video

- recording and editing. Peripheral devices such as stereo glasses, head-mounted displays, and trackers. Prerequisite: CSci 185, 211. (Spring)
- 263 **Computer Graphics II (3)** Hahn and Staff
- Curves and surfaces. Spatial sampling and aliasing. Visible surface algorithms. Illumination and shading models, raytracing and radiosity. Image manipulation and texture mapping. Procedural models. Prerequisite: CSci 185. (Spring)
- 264 **Design of Human–Computer Interface (3)** Sibert and Staff
- Design of dialogues for interactive systems. Psychological, physiological, linguistic, and perceptual factors. Advantages and disadvantages of various interaction techniques, command language syntaxes, and data presentations. Design methodology and guidelines. Case studies, research readings, and projects. Prerequisite: CSci 210. (Spring)
- 266 **Computer Animation (3)** Hahn and Staff
- Euler angles and quaternions; articulated figure motion; forward and inverse kinematics; kinematic, physics based, and behavioral motion control; rendering problems (temporal aliasing); sound synthesis and synchronization; recording and editing techniques. Prerequisite: CSci 185 or permission of instructor. (Fall)
- 270 **Artificial Intelligence (3)** Bock and Staff
- Representation and space search. Heuristic search. Predicate calculus. Knowledge representation and knowledge engineering for expert systems. Rule-based, hybrid, and O-O systems. Semantic nets, frames, and natural language. Theorem provers.

Overview of planning, learning, neural nets. Use of AI languages. Prerequisite: CSci 174, 212. (Fall)

271 Adaptive Learning Systems I (3) Bock and Staff

Learning as an alternative to rule-based schemes for artificial intelligence.

Deterministic and probabilistic simulation of games. Markovian and bounded-context systems. The algedonic process. Introduction to collective learning systems theory.

Design, simulation, and evaluation of collective learning automata. Prerequisite: CSci 174, 212. (Fall)

278 Models of Cognition (3) Bock and Staff

The central nervous system as a natural precedent for AI: structure and function of the neuron and neural networks; sensors and actuators; modular brain function. The cognitive process. Intelligence metrics. Genetics and self-organizing systems.

Memory mechanisms. The psychological basis of learning and behavior. Prerequisite: CSci 174, 212. (Spring, odd years)

283 Computer Security (3) Vora and Staff

Functional description of cryptographic primitives. Risk analysis. Policy models: security, confidentiality, integrity, hybrid. Design principles: access control, information flow, confinement. Assurance: formal methods, evaluation. Malicious logic: security effects of programming languages. Prerequisite: CSci 211. (Fall)

284 Cryptography (3) Vora and Staff

Review of mathematical theory for cryptography. Classical ciphers. Modern block and stream ciphers. Symmetric and asymmetric systems. Digital signatures. Public key infrastructure. Authentication. Prerequisite: CSci 212. (Spring)

- 286 **Network Security (3)** Zhang and Staff
- Security protocols and applications in local, global, and wireless networks; IPSec and packet-level communication security systems; network authentication and key-exchange protocols; intrusion detection systems and firewalls; secure network applications; network worms and denial-of-service attacks. Prerequisite: CSci 283. (Spring)
- 287 **Computer Network Defense (3)** Narahari and Staff
- Offensive and defensive information warfare operations. Simulation of various attacks on and defenses of computer systems. Laws related to information warfare. History and literature related to information warfare attacks. Prerequisite: CSci 286.
- 288 **Wireless and Mobile Security (3)** Cheng and Staff
- Mobile Agents, Wireless Web, WAP, WEP, Peer-to-Peer Computing; secure routing; intrusion detection and authentication on wireless networks; security for handheld devices; encryption and cryptographic measures for wireless; real-time wireless security; security measures for embedded devices. Prerequisite: CSci 232, 283.
- 289 **E-commerce Security (3)** Staff
- Advanced technical topics in e-commerce security. X.500 registration systems, X.509/PKIX certification systems, secure payment methods, smart cards, authorization models in open distributed environments. Secure web systems, technologies, and applications. Prerequisite: CSci 286. (Fall)
- 297 **Special Topics (1 to 3)** Staff
- Topics to be announced in the Schedule of Classes. (Fall and spring)
- 298 **Research (arr.)** Staff

Applied research and experimentation projects, as arranged. May be repeated for credit.

299–300 **Thesis Research (3–3)** Staff

301 **Research and Evaluation Methods (3)** Bock and Staff

Required for all computer science doctoral candidates. The scientific method; research/design requirements and objectives: qualitative, quantitative, and case studies; performance metrics; design procedures and control; sources of error and bias; evaluation tools; formal validation methods; documentation standards.

Prerequisite: ApSc 115. (Fall)

325 **Advanced Topics in Computing Algorithms (3)** Choi and Staff

Graph algorithms, strongly connected components, biconnected components, dominators in acyclic graphs, ordered trees, network flow, planarity testing, bipartite matching, theory of NP completeness, NP-complete problems. Design and analysis of approximation algorithms for NP-complete problems. Prerequisite: CSci 212.

(Spring, odd years)

326 **Parallel Algorithms (3)** Youssef and Staff

Design and analysis of parallel algorithms. Topics include shared- and distributed-memory parallel computation models, graph algorithms, divide-and-conquer algorithms, numerical problems, parallel algorithms for combinatorial optimization methods. Prerequisite: CSci 211, 212. (Spring, even years)

332 **Advanced Topics in Computer** Simha and Staff

Networks and Networked Computing (3)

- Seminar on current research and developments in computer networks, Internet, networked computing, mobile computing and pervasive computing. May be repeated for credit. Prerequisites: CSci 211, 212, 233. (Fall, odd years)
- 338 **Advanced Topics in Distributed Systems (3)** Cheng and Staff
Seminar on current research and developments in networks and distributed systems. May be repeated for credit. Prerequisite: CSci 234. (Fall, odd years)
- 339 **Advanced Topics in Computer Architecture (3)** Narahari and Staff
Seminar on current research and developments in computer architecture. May be repeated for credit. Prerequisite: CSci 235. (Spring, even years)
- 342 **Security and Programming Languages (3)** Simha and Staff
Seminar on current research and developments in computer programming languages, systems and paradigms. May be repeated for credit. Prerequisite: CSci 210. (Spring, odd years)
- 343 **Advanced Topics in Information Systems (3)** Berkovich and Staff
Seminar on current research and developments in computer database systems and information retrieval. May be repeated for credit. Prerequisite: CSci 242 or 244. (Fall, odd years)
- 351 **Advanced Topics in Operating Systems (3)** Rotenstreich and Staff
Seminar on current research and developments in computer operating systems. May be repeated for credit. Prerequisite: CSci 251. (Spring, even years)
- 355 **Advanced Topics in Software Engineering (3)** Rotenstreich and Staff
Seminar on current research and developments in software engineering. Students develop a software package with the aid of available software tools such as

requirement tool, design tool, code generators, testing tools, measurement tools, cost estimation tools. Prerequisite: CSci 255, 256. (Fall, even years)

361 **Advanced Topics in Interactive Multimedia** (3) Heller and Staff

Seminar on current research and developments in interactive multimedia. Team projects encompassing system design, system production, productivity tools, project management, cost analysis, prototyping, testing, and evaluation. Prerequisite: CSci 260. (Spring, even years)

362 **Advanced Topics in Human–Computer Interaction** (3) Sibert and Staff

Seminar on current research and developments in human–computer interaction. May be repeated for credit. Prerequisite: CSci 264. (Fall, odd years)

367 **Advanced Topics in Computer Graphics** (3) Hahn and Staff

Seminar on current research and developments in computer graphics. Spatial and temporal anti-aliasing: hidden-surface algorithms: illumination models, radiosity, textural mapping. May be repeated for credit. Prerequisite: CSci 263. (Fall, even years)

368 **Advanced Topics in Animation and Virtual Reality** (3) Hahn and Staff

Seminar on current research and developments in computer animation and virtual reality. May be repeated for credit. Prerequisite: CSci 266. (Spring, odd years)

371 **Adaptive Learning Systems II** (3) Bock and Staff

Alternative memory structures. Selection and modification policies. Environmental models and evaluation policies. Metrics for performance evaluation of collective learning systems automata. Self-organizing, hierarchical networks of collective learning cells. Prerequisite: CSci 271. (Spring, odd years)

- 372 **Natural Language Understanding (3)** Bock and Staff
- The state of the art of natural language parsing and semantic understanding by computer systems. Review of formal, context-free, and transformational grammars and parsing. Augmented transition networks: problems of complexity, semantics, and context. Deterministic parsing and semantic parsing. Prerequisite: CSci 270.
- (Fall, odd years)
- 377 **Advanced Topics in Machine Intelligence and Cognition (3)** Bock and Staff
- Seminar on current research and developments in machine intelligence and cognitive science. May be repeated for credit. Prerequisite: Permission of the instructor.
- (Fall, even years)
- 381 **Advanced Topics in Cryptography (3)** Vora and Staff
- Linear and differential cryptanalysis. Cryptanalysis of AES. Factorization and primality. Computational and information-theoretic secrecy. Theory of secrecy. Zero-knowledge proofs. Secret sharing. Cooperative distributed cryptography. Provable security. Prerequisite: CSci 284. (Fall)
- 386 **Java Security Mechanisms (3)** Staff
- Theoretical overview and practical aspects of Java security solutions. Students develop individual Java security modules and integrate them into a complete Java security system. Prerequisite: CSci 283. (Spring)
- 387 **Advanced Topics in Information Security (3)** Vora and Staff
- Seminar on current research and developments in information assurance. May be repeated for credit. Prerequisite: CSci 283. (Spring, even years)
- 390 **Colloquium (0)** Staff

Lectures by outstanding authorities in computer science. Topics to be announced each semester. (Fall and spring)

398 **Computer Science Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy qualifying examination.

May be repeated for credit.

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit.

COUNSELING/HUMAN AND ORGANIZATIONAL STUDIES

Professors J.C. Heddesheimer, C.H. Hoare, D.R. Schwandt, M. Marquardt, S.A. Marotta, J.

Garcia

Associate Professors N.E. Chalofsky, R.B. Morgan, C.D. Erickson, R. Lanthier, P.L. Schwallie-

Giddis (*Chair*), A.J. Casey, M.C. McGuire-Kuletz, K.C. Hergenrather, M. Cseh, S. Khilji, D.

Burley

Assistant Professors M.S. Wesner, M.M. Megivern, R.M. Dedmond, M. Gorman-Kirchoff, E.

Goldman, S. Beveridge, S. Steen

Professorial Lecturers J.A. Merz, R.J. Pasi, V.A. Sardi, B.J. Peters, C.C. Lorente, S.K. Peters, O.

Madison-Colmore

Lecturers P. Tschudi, E. Rhymers

See the Graduate School of Education and Human Development for programs of study leading to the degrees of Master of Arts in Education and Human Development, Education Specialist, and Doctor of Education. Note that the Ph.D. in the field of counseling is offered through Columbian College of Arts and Sciences in collaboration with the Graduate School of Education and Human Development.

COUNSELING

- 220 **Special Workshop** (arr.) Staff
Topics to be announced in the Schedule of Classes. May be repeated for credit.
- 251 **Professional and Ethical Orientation to Counseling** (3) Garcia, Dedmond
The roles and functions of a professional counselor and the ethical standards that govern the profession.
- 253 **Counseling Interview Skills** (3) Hergenrather, Heddesheimer, Erickson
Acquisition of counseling skills common to all theories through lectures, demonstrations by faculty, role playing, and videotaping. Prerequisite or concurrent registration: Cnsl 251 (for counseling majors); permission of instructor is required for others. Material fee.
- 254 **Psychosocial Adaptation** (3) Hoare, Erickson
Mental health problems; emphasis on needs of counselors, teachers, and others working with children, adolescents, and adults.
- 255 **Career Counseling** (3) Erickson, Schwallie-Giddis, Dedmond
A consideration of theory, practice, and the body of information related to career counseling, choice, and development over the life span. Prerequisite: permission of instructor is required for non-counseling majors. Material fee.
- 257 **Individual Assessment in Counseling** (3) Marotta, Hergenrather
Detailed study of individual analysis and appraisal techniques. Development of systematic case study. Prerequisite: permission of instructor is required for non-counseling majors to register. Material fee.
- 259 **Theories and Techniques of Counseling** (3) Schwallie-Giddis, Beveridge

- An introduction to basic counseling and psychotherapeutic theories and associated techniques. Prerequisite or concurrent registration: Cnsl 251 (for counseling majors); permission of instructor is required for others.
- 261 **Group Counseling (3)** Erickson, Steen
- Principles of group dynamics as related to interaction within groups. Techniques and practice in group counseling. Prerequisite or concurrent registration: Cnsl 251 (for counseling majors); permission of instructor is required for others.
- 263 **Social and Cultural Dimensions of Counseling (3)** Garcia
- Basic sociocultural concepts in counseling theory and how they apply to the practice of the counseling profession. Prerequisite or concurrent registration: Cnsl 251 (for counseling majors); permission of instructor is required for others.
- 264 **Values, Spiritual, and Religious Issues in Counseling (3)** Staff
- The theoretical and practical intersection of counseling, psychotherapy, and mental health considerations with religion and spirituality. The clinically effective and ethically responsible integration of religion and spirituality into counseling.
- Prerequisite or concurrent registration: Cnsl 251 (for counseling majors); permission of instructor is required for others.
- 266 **Foundations of School Counseling K–12 (3)** Schwallie-Giddis,
Dedmond, Steen
- Study of the environmental and specialty elements for school counseling, with special attention to the principles and practices of school counseling.
- 267 **Foundations of Employee Assistance Programs (3)** Staff

History, legislation, and foundations of practice of counseling in employee assistance programs. Prerequisite or concurrent registration: Cnsl 251 (for counseling majors); permission of instructor is required for others.

268 **Foundations of Clinical Mental Health Counseling (3)** Erickson, Marotta

Description of community counseling settings, problems clients present, and a consideration of appropriate intervention strategies.

269 **Substance Abuse Counseling (3)** Hergenrather, Steen, and Staff

Individual, group, family, and self-help counseling applied to substance abusers.

Prerequisite or concurrent registration: Cnsl 251 (for counseling majors); permission of instructor is required for others.

271 **Family Counseling (3)** Marotta

The family as a system: how it affects the client and how the client affects it. Didactic presentations, role playing, and work with simulated families. Prerequisite or concurrent registration: Cnsl 251 or 276 (for counseling majors); permission of instructor is required for others.

272 **Human Sexuality for Counselors (3)** Hoare, Marotta

Issues of sexuality as related to counseling in contemporary society. Prerequisite or concurrent registration: Cnsl 251 or 276 (for counseling majors); permission of instructor is required for others.

274 **Counseling Older Persons (3)** Staff

Special considerations and counseling emphases in regard to the life transitions and role changes that occur for older persons. Prerequisite or concurrent registration: Cnsl 251 (for counseling majors); permission of instructor is required for others.

- 275 **Living and Dying: A Counseling Perspective (3)** Staff
Survey of fundamental psychosocial issues surrounding grief, loss, and life-threatening illness. Topics include AIDS, suicide, multiple loss, caregiver's grief, spirituality, and cross-cultural issues.
- 276 **Foundations of Rehabilitation and Case Management (3)** Hergenrather
Survey of history, philosophy, basic principles, legislation, roles, and services.
- 278 **Disability Management and Psychosocial Rehabilitation (3)** Hergenrather, Beveridge, and Staff
Disability management services; psychosocial aspects of disability; rehabilitation services for persons with psychiatric disabilities.
- 280 **Job Placement and Supported Employment (3)** Staff
Job development and modification: placement of persons with disabilities.
- 281 **Medical and Psychosocial Aspects of Disabilities (3)** Garcia, Hergenrather
Chronic and traumatic disorders with rehabilitation and psychosocial implications.
- 285 **Practicum/Internship in Counseling (3)** Erickson, Garcia, Heddesheimer, Hergenrather, Megivern, Marotta
Part of a two-semester clinical experience for degree and certificate candidates in counseling. Includes 100 hours of supervised practicum in a counseling setting.
Material fee.
- 286 **Advanced Internship in Counseling (3 to 6)** Erickson, Garcia, Heddesheimer, Hergenrather, Megivern, Marotta
Part of a two-semester clinical experience for degree and certificate candidates in counseling. Material fee. Prerequisite: Cnsl 285.

- 290 **Advanced Career Counseling (3)** Dedmond, Schwallie-Giddis, and Staff
- Expansion of career development theory, concepts, and practice: the helping relationship, delivery systems, current market and economic information, and available resources. Prerequisite: Cnsl 255 (for counseling majors); permission of instructor is required for others. Material fee.
- 293–94 **Research and Independent Study (1 to 3)** Staff
- Individual research under guidance of a staff member. Program and conferences arranged with an instructor.
- 298–99 **Thesis Research (3–3)** Staff
- 344 **Advanced Group Counseling (3)** Erickson, Steen
- A post-master's course on interpersonal process groups, with didactic, experiential, and supervisory components. Prerequisite: Cnsl 261 or equivalent; permission of instructor is required.
- 352 **Organization and Administration
of Counseling Services (3)** Marotta, Lanthier, Erickson
- Theory and practice of consultation and administration, with focus on school, community, and rehabilitation settings. Research issues. Admission by permission of instructor.
- 353 **Work, Identity, and Adult Development (3)** Hoare
- Same as HDev/HOL 353.
- 357 **Doctoral Practicum in Counseling (2)** Marotta, Erickson, Megivern

Experiential learning of advanced counseling and counseling-related competencies through direct, supervised participation in group work, research, teaching, and/or consultation. Admission by permission of instructor.

358 **Advanced Theories of Counseling** (3) Garcia, Hergenrather

Current research on counseling and psychotherapy process and outcome; critical analysis of theory with applications for practice and research. For Ed.S. and Ph.D. degree candidates in the field of counseling. Admission by permission of instructor.

359–60 **Doctoral Internship in Counseling and Counselor Supervision** (2–2) Marotta, Erickson

361 **Seminar: Counseling** (arr.) Staff

390 **Predissertation Seminar** (3 to 6) Staff

391 **Dissertation Research** (3 or 6) Staff

Prerequisite: Cnsl/Educ 390.

HUMAN DEVELOPMENT

208 **Lifespan Human Development** (3) Hoare, Lanthier

Continuity and change in developmental attributes. The developing person in relation to social norms, roles, and stage-graded expectations from birth to death. Interaction between biogenetics and environment.

209 **Child Development** (3) Lanthier and Staff

Normal development and the familial and social antecedents of developmental risk. Environments that foster competent children and developmental sequelae of childhood vulnerability and trauma. Adulthood consequences of child abuse and neglect.

- 210 **Adolescent Development (3)** Lanthier and Staff
- Key attributes and problems in adolescent development. Normal adolescent development and contemporary social problems in relation to stress, risk, and resilience. For graduate students in counseling, psychology, and related areas.
- 229 **Cultural Effects on Human Development (3)** Lanthier and Staff
- Effects of culture on the experience and expression of self, others, space, time, faith systems, norms, and other attributes. Egocentric and sociocentric effects, primitive and technological effects. Group immersion as the basis for prejudice. Developmental consequences as a consequence of cultural context.
- 261 **Practicum in Human Development (3)** Hoare and Staff
- Admission by permission of instructor.
- 262 **Internship in Human Development (3)** Hoare and Staff
- Admission by permission of instructor.
- 281 **Adult Learning (3)** Hoare
- Same as HOL 281.
- 341 **Emotional and Cognitive Development (3)** Hoare, Lanthier
- The development and maintenance of emotional competence, cognitive development, self-esteem, social cognition, and interpersonal skills. Relationships between intellectual reasoning and insight.
- 344 **Adult Development (3)** Hoare
- Theories and research on personality and intelligence in adulthood. Research designs and methods. Implications of developmental data for counseling and selected professional roles.

353 **Work, Identity, and Adult Development (3)** Hoare

The influence of work on identity, intellectual and personality development, and other developmental attributes. Same as Cnsl/HOL 353.

356 **Issues and Special Topics in Human Development (3 to 6)** Hoare, Lanthier

Issues and special contemporary topics related to child, adolescent, and adult development. Applications for professional roles.

HUMAN AND ORGANIZATIONAL LEARNING

220 **Special Workshop (arr.)** Staff

Topics to be announced in the Schedule of Classes. May be repeated for credit.

234 **Action Learning (3)** Marquardt

Processes, principles, and skills necessary to participate in and lead both single- and multiple-problem action learning sets. The six dimensions of action learning; educational psychological, political, sociological, and management theories underlying action learning.

236 **Technology and Human Resource Development (3)** Staff

How technology can best be utilized in the HRD environment. Discussion of CBT, use of the Internet for instruction, and distance learning techniques.

239 **International and Multicultural Issues in Organizations (3)** Cseh, Marquardt, Khilji

The impact of culture and globalization on U.S. and international human and organizational learning programs and practices. Adult learning and organizational change approaches that develop and utilize the synergy of a global workforce.

263 **Foundations of Human Resource Development (3)** Wesner, Morgan, Khilji

- How individuals and groups learn and interact within organizations and how organizations function and learn. Motivation, group dynamics, systems theory, organizational culture, and change.
- 264 **Design of Adult Learning Interventions (3)** Goldman, Hoare, Marquardt
Designing and implementing adult learning programs. Topics include instructional design techniques, designing effective programs, program planning and marketing techniques, and conducting needs assessments and evaluations of adult learning programs.
- 269 **Organization Diagnosis and Development (3)** Cseh, Wesner, Khilji
The assessment of organizational conditions, including collection and interpretation of information, operations, and problems (human, structural, and systemic). Course participants collect and analyze data to provide solutions to enhance organizational effectiveness.
- 272 **Internship in Human Resource Development (3 to 6)** Staff
Supervised experience in selected areas of human resource development and adult education. Admission by permission of instructor.
- 274 **Work Groups and Teams in Organizations (3)** Chalofsky, Goldman, Wesner, Morgan
Exploration of the nature of work groups and teams as they are utilized in organizational settings. Group and team dynamics, facilitating and leading skills, and group roles and culture.
- 277 **Increasing the Capacity to Learn (3)** Chalofsky

- Identification of actions that can help increase the capacity to learn. Emphasis on experimental learning and critical reflection.
- 281 **Adult Learning (3)** Cseh, Goldman, Hoare
- Premises and theories used to meet learning needs of adults. Overview of various learning theories and the impact of various stages of adult development on learners. Topics including self-directed learning, accommodating individual learning needs, and creation of effective learning techniques. Same as HDev 281.
- 282 **Advanced Strategies for Adult Learning (3)** Staff
- Theoretical and practical strategies of adult learning in various settings, including corporate environments. Learning strategies, such as creative thinking and self-directed learning. Critical adult learning issues.
- 283 **Leadership in Organizations (3)** Cseh, Goldman, Gorman-Kirchoff
- Developments in theory and research centered on organizational leadership. Emphasis on transformational leadership.
- 284 **Assessing the Impact of HRD Efforts (3)** Morgan and Staff
- Knowledge and skills needed to evaluate the impact and return on investment of HRD efforts. Focus on how to plan and conduct systematic evaluations of HRD efforts, including the choice, development, and use of various tools for measuring individual, group, and organizational change.
- 286 **Issues in Human Resource Development (3)** Morgan, Khilji, and Staff
- Current issues and topics of importance in the field. Students gather data and analyze key topics associated with areas such as globalization, diversity in the workplace, organizational development, and ethics.

- 287 **Strategic Human Resource Development (3)** Morgan, Khilji
- Overview of systematic development of an organization's capability to implement its strategy. Leading an organization through change, with an emphasis on HRD systems.
- 288 **The Humane Organization (3)** Chalofsky
- Characteristics of the humane organization and of meaningful work. Intrinsic motivation, work-life balance, and the workplace community.
- 289 **Consulting Skills for Organizational Learning and Change (3)** Cseh, Chalofsky, Goldman
- Introduction to the concepts, methods, and skills required for effective consultation in organizations, as either an internal or an external consultant. Meeting the human needs in organizations, while improving performance and productivity. Students undertake a consulting project in an organization.
- 290 **Organizational Learning (3)** Staff
- Learning in an organizational context. Processes through which the organization as a system learns, unlearns, changes, and disseminates information. Organizational learning theories address the processes and barriers of gathering, using, developing, and retaining knowledge in organizations.
- 293–94 **Research and Independent Study (1 to 3)** Staff
- Preparation of an in-depth project under the guidance of a faculty member. The course is arranged individually with an instructor.
- 299–300 **Thesis Research (3–3)** Staff
- 320 **Topics in Human and Organizational Learning (3)** Staff

Topics to be announced in the Schedule of Classes.

- 321 **Seminar: Advanced Issues in Human and Organizational Learning (3)** Casey, Cseh, Burley
- 322 **Organizations and Strategy in Human Resource Systems (3)** Schwandt
Overview of paradigms, theories, models, and constructs of organizations and strategy to understand organizations and their environments.
- 323 **Managerial and Organizational Cognition (3)** Casey
The emerging field of collective cognition in organizations, including theoretical foundations and seminal and current literature on knowledge structures and their role in strategy formation, organizational change, and sensemaking.
- 325 **Human Systems Change (3)** Burley, Schwandt
The classical and contemporary ideas related to social systems change; the relation of these ideas to current issues in organizations.
- 327 **Seminar: Applied Research in Human and Organizational Learning (3)** Casey, Cseh, Burley
- 353 **Work, Identity, and Adult Development (3)** Hoare
Same as Cnsl/HDev 353.
- 363 **Foundations of Human and Organizational Learning (3)** Chalofsky, Schwandt, Cseh
Relationships between individuals and their interactions in groups within an organizational context. Overview of theoretical foundations of key areas associated with HOL. Motivation, systems theory, group dynamics, organizational culture, and learning.

- 369 **Theory and Design of Organizational Diagnosis and Development (3)** Cseh, Schwandt, Khilji
- Focus on various paradigms through which organizations and their functions may be viewed; a variety of analytical models of organizations; techniques for assessing systems; application of analysis techniques.
- 374 **Work Groups and Teams in Organizations (3)** Chalofsky, Marquardt
- Theoretical understanding and practical considerations of working with groups and teams. Group dynamics, facilitating and leading groups, and member roles. Group facilitation techniques across different group settings and environments.
- 379 **Practicum in Human and Organizational Learning (3 to 6)** Staff
- 380 **Advanced Organizational Learning (3)** Schwandt, Casey, Burley
- The psychological and sociological paradigms associated with the learning of a collective whole.
- 381 **Theory, Research, and Practice in Adult Learning and Development (3)** Cseh, Goldman, Hoare
- Learning theories as applied to adults in individual and group learning transactions; effect of age on learning; psychological, physical, and social environments in adult education situations.
- 386 **Interdisciplinary Readings in Human and Organizational Learning (3)** Schwandt, Casey, Chalofsky
- Seminal works from various disciplines related to current research and practice.
- 390 **Predissertation Seminar (3 to 6)** Staff
- 391 **Dissertation Research (3 or 6)** Staff

Prerequisite: HOL 390.

CRIMINAL JUSTICE

See **Sociology**.

DECISION SCIENCES

Professors E.H. Forman, P.W. Wirtz, P.K. Bagchi, R. Soyer, T. Glickman

Associate Professors D.L. Zalkind, S.Y. Prasad (*Chair*), M.M. Tarimcilar, S. Kanungo, D.F.

Cioffi, Y.H. Kwak, A. Jarrah

Assistant Professors F.T. Anbari, H. Khamooshi, S.C. White, M.E. Matta, S. Jain, M.A. Lejeune

See the School of Business for programs of study in business administration leading to the degrees of Master of Business Administration and Doctor of Philosophy.

202 Mathematics and Statistics for Management (3) Wirtz, Glickman, Khamooshi

Mathematical and statistical concepts employed in the solution of managerial problems. Applications of functions, elements of calculus, and linear algebra.

Introduction to probability, frequency distributions, statistical inference, and regression and correlation. (Fall, spring, and summer)

220 Analytical Models for Decision Making (3) Soyer, Glickman,
Prasad, Tarimcilar

Survey of analytical models for decision making and their applications. Topics include probabilistic, deterministic, and sequential models, single- and multiattribute utility theory, graphical models, Bayesian inference, forecasting, and concepts from game theory. Prerequisite: MBAd 221, 222, and 223. (Fall and spring)

221 Purchasing and Materials Management (3) Bagchi, White

Industrial purchasing and materials management principles and practices.

Organization and functions in materials management. Determination of requirements, supplier qualifications, source selection, buying practices, policies, and ethics.

International purchasing. (Fall and spring)

222 Logistics Management (3) Bagchi, White, Matta

Supply chain management in production, service, and public organizations.

Analytical tools for planning and establishing operating systems and for their operation, control, and modification. Examination of processes, products, services, equipment, and facilities. Relationships of human systems and operating systems. (Fall)

223 Manufacturing Control Systems (3) Bagchi, White

Inventory and production control concepts, techniques, and strategies for effective integration with basic finance, marketing, and manufacturing objectives. Forecasting methods, material requirements planning systems, distribution requirements planning techniques, process control, and classical reorder-point inventory models. (Fall)

224 Executive Decision Making (3) Forman, Soyer, Tarimcilar, White

Concepts and methods for making complex decisions in both business and government; identifying criteria and alternatives, setting priorities, allocating resources, strategic planning, resolving conflict, and making group decisions. (Fall and spring)

226 Decision Support Systems (3) Tarimcilar, Prasad, Zalkind, Williams

Framework, processes, and technical components for building decision support systems dealing with unstructured and underspecified problems from managerial and

organizational perspectives. Construction and exploration of decision support system models. Prerequisite: DnSc 220 or permission of instructor. Same as ISTM 226.

(Fall and spring)

227 **Advanced Logistics (3)** Bagchi, White

Modeling approaches in supply chain management; optimization of cost and service.

Alternatives available to the manager, given the economic situation, competitive conditions, and regulatory environment of the several transportation modes. Model location theory and logistics network planning and design. Prerequisite: DnSc 222.

(Spring)

228 **Operations Strategy (3)** Bagchi, White, Matta

Basic procurement and logistics methods and techniques that influence formulation of a firm's strategic policy. Traditional and updated and improved systems for controlling capacity and output. Examination of productivity analysis, cost control, materials planning, and other topics to ensure that the strategy formulation/operations function contributes to overall profit. (Spring)

229 **Decision Analysis (3)** Forman, Soyer, Prasad, Tarimcilar

Topics include decision theory, value of information, utility theory, modeling attitude toward risk, risk management, multi-criteria decision-making paradigms, Bayesian statistics, game theory, and strategic decision making. Graphical models and decision structuring tools. Prerequisite: DnSc 220 or permission of instructor. (Spring)

234 **Procurement and Contracting (3)** White

Principles and concepts essential to effecting large procurement programs. Planning, sourcing, and contractual design for diverse acquisitions. Emphasis on federal

- government policy with comparison of buying at other governmental levels and the private sector. (Spring)
- 261 **Introduction to Project and Program Management (3)** Cioffi, Williams
- Practical examination of how projects can be managed from start to finish, including specific emphasis on planning and controlling to avoid common pitfalls. Identifying needs, defining requirements, project costing, scheduling, resource allocation, and project politics. (Fall, spring, and summer)
- 262 **Directed Computational Project Management (3)** Cioffi
- Practical examination of project management concepts by quantitative application using various software tools. Research in real cost data to support project calculations. Prerequisite: DnSc 261, 267.
- 263 **Managing External Projects (3)** Anbari
- Fundamentals of contract management from a project manager's perspective. The outsourcing process, associated project strategies, and legal elements. Acquisition planning, vendor selection, contract formulation, and performance control.
- 265 **International Development for Project Managers (3)** Carayannis
- Foundations and methodologies for problem solving in multicultural project environments. (Fall, spring, and summer)
- 266 **Risk Management (3)** Kwak
- Basic principles of risk management practices. Developing a risk management plan, including identifying, analyzing, mitigating, and monitoring projects risks.
- Prerequisite: DnSc 202, DnSc 261.
- 267 **Planning and Scheduling (3)** Cioffi, Khamooshi

Integrated planning, scheduling, and control systems for planning the scope of a project; optimizing time, cost, and resources; and monitoring and controlling schedules, including those for delayed projects. Prerequisite: DnSc 202, 261.
(Fall, spring, and summer)

268 Project Estimation and Cost Management (3) Anbari

Formalized procedures, tools, and techniques used in developing the project estimate during the planning stages and updating the estimate throughout the project life-cycle; tools and techniques used in monitoring, managing, and controlling the cost of the project, including earned-value management. Prerequisite: M.S.P.M. candidacy.
(Fall and spring)

269 Project Management Capstone (3) Cioffi, Kwak, Anbari

Students will be expected to demonstrate integration of the knowledge accumulated in their study plan and apply integrated knowledge and experience to best practices, a project case history, and a handbook. Prerequisite: M.S.P.M. candidacy or permission of instructor. (Fall and spring)

274 Statistical Modeling and Analysis (3) Wirtz, Forman, Soyer

The process of specifying, analyzing, and testing models of human and systemic behavior. Formalization of models; statistical test comparison and selection; computer implementation of univariate, bivariate, and multivariate tests. General linear model: linear regression, analysis of variance, and analysis of covariance. Prerequisite: MBAd 220 or equivalent. (Fall and spring)

275 Advanced Statistical Modeling and Analysis (3) Wirtz

Advanced topics associated with the general linear model. Testing for and remediation of assumption violations. Detection of outliers, influential observations, and multicollinearity. Alternative design strategies in the analysis of variance; latent growth analysis; hierarchical linear modeling; testing for interactions and parallelism. Prerequisite: DnSc 274 or permission of instructor.

276 Exploratory and Multivariate Data Analysis (3) Wirtz

Methods for exploratory and multivariate data analysis. Application and comparison of advanced multivariate analytical procedures. Multivariate and discriminant analysis, LISREL analysis, and canonical correlation. Prerequisite: DnSc 274 or permission of instructor. (Fall)

277 Applied Forecasting and Time-Series Analysis for Managers (3) Soyer

Introduction to various forecasting techniques, including time-series regression models, cyclical trends, exponential smoothing methods, seasonal and nonseasonal ARIMA processes, and the Box–Jenkins approach. Application of forecasting methods in economics, finance, and marketing. Prerequisite: MBAd 220 or permission of instructor. (Spring)

279 Data Mining (3) Prasad, Wirtz

Techniques that can be used to discover relationships in large data sets, including regression models, decision trees, neural networks, clustering, and association analysis.

290 Special Topics (1 to 3) Staff

Experimental offering; new course topics and teaching methods. May be repeated once for credit.

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|-----|---|---------------|
| 298 | Directed Readings and Research (3) | Staff |
| 299 | Thesis Seminar (3) | Staff |
| 300 | Thesis Research (3) | Staff |
| 328 | Special Topics in Decision Making (3) | Soyer |
| | Special topics and advanced applications, such as catastrophe theory, Markovian decision processes, and Bayesian statistics. May be repeated once for credit. | |
| 329 | Seminar: Logistics and Operations Management (3) | Bagchi, Perry |
| | Recent developments in production and logistics management; impact of technological economic and social change; significant related trends. Private- and public-sector policy implications. New and emerging analysis techniques. Open only to doctoral students. | |
| 385 | Special Topics in Research Methods (3) | Wirtz |
| | Research problems and issues related to student dissertations form topics for readings, group discussions, and assigned papers. (Fall and spring) | |
| 390 | Philosophical Foundations of Administrative Research (3) | Artz |
| | Philosophy of science as applied to research in administration. Topics include the nature and current problems of epistemology, the development and role of theories, and the relationship between theory, methodology, and empirical data.
(Fall and spring) | |
| 391 | Advanced Problems in Research Methodology (3) | Wirtz |
| | Use of models and theoretical frameworks in research; formulation of research questions, hypotheses, operational definitions, research designs, sampling and data | |

analysis approaches. For doctoral candidates who have completed the general examination and all courses and are preparing for their dissertation.

(Fall and spring)

397 **Doctoral Seminar** (1 to 3) Staff

Current research and scholarly issues in management science.

398 **Advanced Reading and Research** (arr.) Staff

Limited to doctoral candidates preparing for the general examination. May be repeated for credit.

399 **Dissertation Research** (arr.) Staff

Limited to doctoral candidates. May be repeated for credit.

ECONOMICS

Professors J.L. Gastwirth, R.M. Dunn, Jr., R.S. Goldfarb, A.M. Yezer, J.J. Cordes, J. Pelzman, R.P. Trost, B.L. Boulier, H.S. Watson, M.D. Bradley, S.C. Smith, P. Labadie, G.L. Kaminsky, D.O. Parsons, R.F. Phillips (*Chair*), M.O. Moore, N. Vonortas, F.L. Joutz, S. Joshi

Associate Professors A.S. Malik, S.M. Suranovic, W.P. Mullin, V. Fon, R.M. Samaniego

Assistant Professors M. Cipriani, C. Wei, S. Emran, M.X. Chen, A. Fostel, T. Sinclair, P. Carrillo, S. McCoskey

Professorial Lecturers S.N. Kirby, R.S. Belous, D. Fixler, H. Hertzfeld, H. Stekler, F.D. Weiss, L. Clauser, N. Pham

Master of Arts in the field of economics—Prerequisite: (1) a Bachelor of Arts degree with a major in economics or with course work in economics that includes intermediate microeconomic and macroeconomic theory (equivalent to Econ 101, 102 or 217–18); (2) an understanding of basic calculus, equivalent to Math 31–32. Applications are accepted for the fall semester only.

Required: the general requirements stated under Columbian College of Arts and Sciences and completion of one of the following options.

Option A: 30 credits of course work, including Econ 301, 305, 375, 376, and either 302 or 306; and five additional courses chosen in consultation with the Department's M.A. advisor. (Four of these additional courses come from two clusters—groups of related courses—with two courses from each cluster. An M.A. thesis may be substituted for the two courses in one of these clusters.) Students must earn at least a grade of *B–* in Econ 301, 305, and either 302 or 306.

Option B (primarily for those interested in pursuing a Ph.D.): 30 credits of course work, including Econ 301, 302, 305, 306, 375, 376, and either 303 or 307; three additional courses chosen in consultation with the Department's M.A. advisor. Two of these three additional courses (unless only one is available) should fulfill the requirements of one of the Department's Ph.D. fields (excluding micro and macro theory). Students must earn at least a grade of *B–* in Econ 301, 305, and either 302 or 306.

Doctor of Philosophy in the field of economics—The Ph.D. program involves study in two sequential units. Unit I includes satisfactory completion of required course work, and passing the General Examination. This first unit must be concluded within five years after entry into the program. Upon successful completion of Unit I, students are considered for admission to Unit II, the dissertation stage, which must be completed within five years after entry. In all cases, however, the student is expected to complete the doctorate within eight years after admission.

Students must meet the general requirements stated under Columbian College of Arts and Sciences. For Unit I, requirements include core theory and econometrics courses—Econ 301, 302, 303, 305, 306, 307, 375, and 376—plus 24 additional credits of 300-level (or approved 200-level) course work and passing the General Examination.

General Examination: The General Examination consists of two preliminary examinations, one in microeconomic theory and one in macroeconomic theory, and two field examinations. Students must take the preliminary examinations within three semesters of entering the program and before any field examinations are taken. Field examinations are given in econometrics, economic development, environmental and natural resource economics, health economics, industrial organization, international economics, international finance, labor economics, monetary theory and policy, public finance, and regional and urban economics.

To pass the General Examination, students must earn (a) a grade of “pass” or better in the preliminary examinations in microeconomic and macroeconomic theory and (b) a grade of “satisfactory pass” or better in one of the two field examinations and no grade below “bare pass.” Two of the examinations, preliminary or field, may be taken a second time with the approval of the Department. No further opportunity to take the examinations is permitted. Substitution of a field examination (in an area not originally chosen by the student) to satisfy the requirements of the General Examination is equivalent to taking a field examination a second time. Students should consult with the professors responsible for their fields and notify the Department two months in advance of their intention to take the examinations. If such notification is not given sufficiently in advance, it may not be possible to sit for the examination.

For Unit II, the requirements include formulation of an acceptable dissertation proposal, completion of a dissertation that demonstrates the candidate’s ability to do original research, and 24 credits of additional graduate course work, of which at least 12 credits must be dissertation research. Students, including those who have an accepted dissertation proposal, must enroll in a dissertation proposal seminar (Econ 397) in the first semester after promotion to Unit II. Satisfactory performance in the seminar will be equivalent to 3 credits of Unit II course work. In

cases where knowledge outside the discipline of economics is critical to the student's research field, up to 6 credits in Unit II may consist of required courses outside the Economics Department.

Departmental prerequisite: Courses at the 300 level are specifically designed for economics graduate students and typically require knowledge of calculus and one or more of the core theory and econometrics courses. Less-well-prepared graduate students in other disciplines may register for 200-level courses after having completed Econ 217–18, or 218 and 219, or 101 and 102, unless the course description indicates that these prerequisites have been waived. Intermediate-level micro and macro courses taken elsewhere usually satisfy this requirement, but introductory or first-year courses do not. Graduate students in economics can take 200-level courses only with permission of their advisor.

214 **Survey of Mathematical Economics (3)** Fon

For graduate students in fields other than economics. Differentiation, partial differentiation, and economic optimization problems; comparative statics; input–output analysis; difference, differential equations, and economic applications.

Prerequisite: one semester of calculus and Econ 217–18.

217–18 **Survey of Economics (3–3)** Goldfarb, Watson, Bradley, Fon,
Joutz, Malik, Sinclair

Intermediate-level microeconomic theory (Econ 217) and intermediate-level macroeconomic theory (Econ 218) for graduate students in fields other than economics. (Econ 217 and 218—fall and spring)

219 **Managerial Economics (3)** Boulrier, Fon, Goldfarb

Intermediate microeconomic theory, with emphasis on production and costs, market structure and pricing, risk analysis, and investment theory and capital budgeting.

Credit cannot be earned for both Econ 217 and 219. (Fall and spring)

- 221 **Economics in Policy Analysis** (3) Cordes, Brock, Goldfarb

Same as PPol 204.

- 222 **Benefit–Cost Analysis** (3) Cellini, Cordes

The application of microeconomic theory and welfare economics to the empirical evaluation of public policies and programs. Applied welfare economics as a framework for policy analysis; empirical measures of welfare change; techniques of benefit–cost analysis. Prerequisite: Econ 221 or PPol 204.

- 237 **Economics of the Environment and Natural Resources** (3) Malik

Analysis of public policy problems relating to the environment and natural resources development and management. Prerequisite: Econ 217. (Spring)

- 239 **Economics of Defense** (3) Staff

Economic analysis applied to national security planning and objectives. Analysis of defense establishment problems, including manpower, the defense industry base, procurement policy. (Spring)

- 248 **Health Economics** (3) Staff

Demand for medical care; organization of the health care delivery industry; policy issues on regulation, efficiency, and allocation of health care services. (Fall)

- 250 **Survey of Economic Development** (3) Smith, Emran

- An introduction to economic problems faced by less developed countries. Emphasis placed on applications to policy-making and evaluation. Prerequisite: Econ 217 or 280 or equivalent. (Spring)
- 255 **Economics of Technological Change** (3) Vonortas
- Economics of research and development; innovation and growth; the role of government in the development and use of new technology. (Fall)
- 269–70 **Economy of China** (3–3) Staff
- Econ 269: Analysis of organization, operation, policies, and problems. Development of the economy since 1949. Econ 270: Examination of critical problems of development. Prerequisite to Econ 270: Econ 269 or permission of instructor. (Academic year)
- 271 **Economy of Japan** (3) Staff
- Analysis of Japanese economic institutions and their contribution to Japan's development. (Fall)
- 280 **Survey of International Economics** (3) Moore, Suranovic
- Introductory-level international trade and finance, primarily for Elliott School students. Topics include the economic effects of trade liberalization and protection, exchange rate determination, and macroeconomic policies in an open economy. Prerequisite: Econ 11–12.
- 283 **Survey of International Trade Theory and Policy** (3) Dunn, Moore, Pelzman, Suranovic
- For graduate students in fields other than economics. Survey of international economics and policy; application of comparative advantage and other arguments for

trade; impact of trade on a domestic economy; new arguments for protectionism; regional trading blocs. (Fall and spring)

- 284 **Survey of International Macroeconomics and Finance Theory and Policy (3)** Dunn, Moore, Pelzman, Suranovic, Kaminsky

For graduate students in fields other than economics. Open-economy macroeconomics; international finance; balance of payments accounting; exchange markets; alternative models of balance of payments determination and adjustment; behavior of flexible exchange rate systems. (Fall and spring)

- 285–86 **Economic Development of Latin America (3–3)** Staff

Econ 285: Diversity of structures of Latin American economies; import substituting industrialization; inflation; problems of underemployment and income distribution.

Econ 286: Structure of trade; protection, exports, and economic development; regional and global economic integration; foreign investment, multinational enterprise, and technology transfer. (Academic year)

- 290 **Principles of Demography (3)** Boulier

Introduction to basic demographic perspectives and data; methods for analysis of population size, distribution, and composition; determinants and consequences of population trends. Departmental prerequisite waived. Same as Geog/Soc/Stat 290. (Fall)

- 291 **Methods of Demographic Analysis (3)** Boulier

Basic methods for analysis of mortality, natality, and migration; population estimates and projections; estimation of demographic measures from incomplete data. Departmental prerequisite waived. Same as Geog/Soc/Stat 291. (Spring)

- 292 **Topics in International Trade (3)** Staff
- Topics on international trade issues and policy. Primarily for master's students in programs other than economics. May be repeated for credit if topic differs.
- (Fall and spring)
- 293 **Topics in International Finance (3)** Staff
- Topics on macroeconomic issues and policies in open economies, including exchange rate regimes, determinants of international capital flows, currency crises, financial contagion, current account sustainability and sovereign crises, fiscal problems, and macro-policies in emerging markets and mature economies. (Fall)
- 294 **Topics in Economic Development (3)** Staff
- Topics on economic development issues and policy vary depending on faculty availability and interest. Primarily for master's students in programs other than economics. May be repeated for credit if topic differs. (Fall and spring)
- 295 **Special Topics (3)** Staff
- Topics vary, depending on current issues of interest and faculty availability.
- (Fall and spring)
- 298 **Reading and Research (3)**
- Limited to master's degree candidates.
- 299–300 **Thesis Research (3–3)**
- 301 **Microeconomic Theory I (3)** Joshi, Fon
- Theory of unconstrained optimization; optimization subject to equality and inequality constraints, along with applications. Profit maximization, utility maximization and cost minimization, concave and quasi-concave functions, monotone comparative

- statics, duality theory, the envelope theorem and Le Chatelier principle, and the Kuhn–Tucker conditions. (Fall)
- 302 **Microeconomic Theory II** (3) Joshi, Fon
Expected utility theory, general equilibrium in a pure exchange economy and economy with production, welfare theorems and the core theory of the competitive firm in the short run and long run, monopoly and price discrimination, models of oligopoly. Prerequisite: Econ 301. (Spring)
- 303 **Microeconomic Theory III** (3) Joshi, Fon
Theory of games, including Nash equilibrium and its refinements and comparative statics, evolutionary game theory, multistage games and subgame perfection, repeated games and oligopolistic supergames, static and dynamic Bayesian games, auction theory, and bargaining theory. Prerequisite: Econ 302. (Spring)
- 305 **Macroeconomic Theory I** (3) Bradley, Labadie, Joutz, Wei
Alternative theories of income, employment, and the price level; impact of monetary and fiscal policy; role of expectations in the economy; and microfoundations of macroeconomic models and dynamic analysis. (Fall)
- 306 **Macroeconomic Theory II** (3) Bradley, Labadie, Joutz, Wei
Extensions of alternative models of income determination, economic growth, and the application of analytical frameworks to the U.S. and international economies. Prerequisite: Econ 305. (Spring)
- 307 **Macroeconomic Theory III** (3) Bradley, Labadie, Joutz, Samaniego
Extensions to stochastic and dynamic general equilibrium frameworks, with emphasis on economic policy. Prerequisite: Econ 306. (Fall)

- 323–24 **Monetary Theory and Policy (3–3)** Labadie
Theory of monetary policy within the framework of contemporary American central banking. (Academic year)
- 341–42 **Labor Economics (3–3)** Parsons
Theory of wages and employment, analysis of labor supply and demand. Analysis of unemployment; unions; wage regulation. (Academic year)
- 345–46 **Industrial Organization (3–3)** Mullin
Econ 345: Economic theory and evidence regarding industrial market structure, conduct, and economic performance. Econ 346: Economic issues in antitrust and government regulation of the U.S. economy. (Academic year)
- 351 **Development Economics I (3)** Smith, Emran
Major analytic concepts, measures, theoretical models, and empirical methods of development economics. (Fall)
- 352 **Development Economics II (3)** Smith, Emran
Continuation of Econ 351. In-depth examination of special research topics with emphasis on methods in applied microeconomics. (Fall and spring)
- 357 **Regional Economics (3)** Yezer
Study of regional planning and growth models, including input–output, programming, and econometric models used by planning agencies; analysis of interregional production, trade, migration, firm location, and pricing models. (Fall)
- 358 **Urban Economics (3)** Yezer

- Analysis of spatial relationships among economic activities within an urban area including the urban land, labor, and housing markets; urban transportation models; fiscal relationships among jurisdictions. (Spring)
- 363 **Public Finance I** (3) Cordes, Watson
- Theoretical and empirical analysis of the economic role of the public sector and the effects of public expenditures on resource allocation and income distribution. Topics include public goods, externalities, social insurance, and benefit–cost analysis. (Fall)
- 364 **Public Finance II** (3) Cordes, Watson
- Theoretical and empirical analysis of the effects of taxes and transfers on the allocation of resources and income distribution. Topics include partial and general equilibrium models of tax incidence, effects of taxes on labor supply, saving, and portfolio choices of households and on investment and financing decisions of firms. (Spring)
- 375 **Econometrics I** (3) Phillips, Trost
- Statistical foundations for econometrics; standard methods of estimation and inference for classical and generalized regression models. Same as Stat 275. (Fall)
- 376 **Econometrics II** (3) Phillips, Trost
- Topics may include asymptotic theory, statistical endogeneity, instrumental variables estimation, discrete and limited dependent variable models, and time–series models. Prerequisite: Econ 375. Same as Stat 276. (Spring)
- 377 **Econometrics III** (3) Phillips, Trost

Econometric methods for systems of equations and panel data, with additional topics that may vary from year to year. Prerequisite: Econ 376.

378 **Economic Forecasting (3)** Joutz

Introduction to the theoretical and applied aspects of economic forecasting. Topics include the role of forecasting, univariate time-series analysis, single equation models, multiple series models, and evaluation of forecasts. Prerequisite: Econ 375 or equivalent or permission of instructor. (Spring)

379 **Laboratory in Applied Econometrics (3)** Trost, Joutz, Phillips

Application of econometric theory and the use of econometric software; students are required to write an empirical research paper. The course usually deals exclusively with either micro or macroeconomic issues. May be repeated for credit provided the topic differs.

381 **International Trade Theory (3)** Moore, Pelzman, Suranovic

International trade theory, including alternative models of the gains from trade and evaluations of the new justifications for protectionism, and analysis of commercial policy, factor flows, and trade and investment with multinational corporations. Prerequisite: most sections require calculus or permission of instructor. (Fall)

382 **International Finance and Open-Economy Macroeconomics (3)** Kaminsky

International finance, including alternative models of balance of payments behavior and adjustment, payments accounting, exchange markets, and alternative exchange-rate regimes. (Spring)

383 **International Financial Markets (3)** Cipriani, Fostel, Kaminsky

Financial economics and international financial markets. Topics include standard asset pricing theory, uncertainty in open economy macroeconomics models, financial market micro-structure, and incomplete markets. (Fall)

395 **Advanced Special Topics (3)** Staff

Topics vary depending upon current interests and faculty availability. Open to graduate students in economics. May be repeated for credit.

397 **Dissertation Proposal Seminar (3)** Staff

Limited to Doctor of Philosophy candidates in Unit II. Critical analysis of current research. Formulation of a dissertation proposal and development of dissertation research strategies.

398 **Advanced Reading and Research (arr.)** Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.

399 **Dissertation Research (arr.)** Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit.

EDUCATIONAL LEADERSHIP

Professors E.B. Howerton, Jr., I.C. Rotberg (*Research*), M.H. Futrell, R.O. Mueller, W.K.

Cummings, E. El-Khawas

Associate Professors C.B. Stapp, J. Gomez, Y. Nakib, S.A. McDade, R.A. Chernak, M.D. Corry,

M. Kim, J.H. Williams, J. Wilson, V. Roach (*Chair*), L. Lemasters, R.R. Watkins, N.B.

Milman, S.A. Dannels

Assistant Professors M. DeSander, C.W. Graham, J. Choi, W. Molasso, T. Wright, S. Swayze,

R.C. Jakeman, M.K. English, A.A. Tekleselassie, P. Ehrensall

See the Graduate School of Education and Human Development for programs of study leading to the degrees of Master of Arts in Education and Human Development, Master of Education, Master of Arts in Teaching, Education Specialist, and Doctor of Education.

Departmental prerequisite: A bachelor's degree from an accredited college or university is prerequisite to all 200-level courses. With permission of the instructor, undergraduates in their senior year may enroll in 200-level courses.

201 **International and Comparative Education (3)** Williams

Theoretical foundations of comparative and international education; systematic investigation of the structure and practices of selected representative school systems in different parts of the world. Emphasis on development of methodologies for comparative study.

202 **Regional Studies in International Education (3)** Cummings, Williams, and Staff

In-depth study of education in a selected region of the world. Structures and issues facing education systems in social, political, economic, cultural, and historical context. Prospects of education for human national development. May be repeated for credit provided the region differs.

203 **Programs and Policies in International Education (3)** Williams, Cummings, and Staff

Overview of policies and programmatic responses to issues in international education. Topics include education and development, international higher education and student services, and education and marginalized people. May be repeated for credit provided the topic differs.

- 204 **Strategies and Analysis in International Education (3)** Williams, Cummings, and Staff
- Strategies for improving education in international contexts. Topics include education and development, international higher education and student services, or education and marginalized people. May be repeated for credit provided the topic differs.
- 205 **International Experiences (1 to 6)** Williams, Cummings, and Staff
- Study and research in a foreign country as part of a group program. Admission by permission of the instructor.
- 206 **Capstone in International Education (3)** Williams, Cummings, and Staff
- Review of core topics in international education and completion of major supervised project or paper. Taken near the end of the master's program in lieu of the Comprehensive Examination.
- 207 **Telecommunications in Education (3)** Staff
- Telecommunication technology in education and training contexts. Students gain practical understanding of networks, wave transmission, fiber optics, satellites, and how these systems support various electronic devices. Prerequisite: Educ 180 or equivalent. (Summer)
- 212 **Introduction to Measurement and Data Analysis (3)** Staff
- Overview of basic measurement concepts, educational and psychological testing, and descriptive data analysis (measures of shape, location, and dispersion; correlation).
- 214 **History of American Education Reform (3)** El-Khawas and Staff
- An examination of how evolving social, economic, and political forces have propelled and opposed American education reform efforts throughout history. (Fall)

- 220 **Experimental Course** (arr.) Staff
Topic to be announced in the Schedule of Classes. May be repeated for credit provided the topic differs.
- 221 **Internship: International Education** (1 to 6) Williams, Cummings
Service in an international education institution or related individually designed program planned to enable the student to connect theory to practice. Admission by permission of instructor. (Fall and spring)
- 222 **Museum Studies** (3) Stapp
An overview of the museum as an environment for learning, considering the influence of institutional history and organizational structure on the museum's mission of serving the public. Admission by permission of instructor. (Summer)
- 223 **Museum Audiences** (3) Staff
A survey of the museum's diverse audience, emphasizing implications for effective programming, with attention to audience research. Admission by permission of instructor. (Fall)
- 224 **Communication Skills** (3) Staff
Theory of and practice in the development of communication skills in the museum. Educational concepts; teaching strategies and techniques; institutional liaison and group process. Admission by permission of instructor. (Summer)
- 225 **Research in International Education** (3) Cummings, Williams
Critical reading and practice in conducting research in international comparative education. May be repeated for credit.
- 226 **Internship and Seminar in Museum Education** (6) Stapp

- Four-day-a-week placement in education departments in area museums supervised by GW faculty. On-campus seminar includes presentations by leading thinkers and practitioners. Admission by permission of instructor. (Spring)
- 227 **Museum Evaluation: Exhibition and Programs (3)** Stapp and Staff
- Evaluation and research methods appropriate to the museum setting. Review of research on museum audiences; designing exhibition and program evaluations. Admission by permission of instructor. Same as MStd 227. (Spring and summer)
- 228 **Selected Topics in International Education (3)** Williams, Cummings, and Staff
- Current trends, themes, and issues in international education. May be repeated for credit provided the topic differs.
- 229 **History of Educational Technology (3)** Staff
- The development of educational technology and the changes in social values and educational philosophy that have shaped modern applications. (Fall and spring)
- 230 **Managing Computer Applications (3)** Staff
- For managers and prospective managers in education and human services who are concerned with the automation of their operations. Basic principles needed to design, implement, and manage an information system. Admission by permission of instructor. (Spring and summer)
- 231 **Educational Hardware Systems (3)** Milman
- Design and implementation of educational hardware systems, including computers and computer networks.
- 232 **Applying Educational Media and Technology (3)** Corry

Theory and practice of educational technology. Key characteristics of different media, principles of application, and issues concerning their appropriate use.

233 **Supervised Experience in Education and** Staff

Human Development Services (3 to 6)

Admission by permission of instructor. (Fall and spring)

234 **Computers in Education and Human Development (3)** Corry

The research and practice surrounding the use of computers in educational and training settings. Students will acquire the practical knowledge necessary to the development and evaluation of computer-related curricula through projects and case studies.

235 **Design and Implementation of Educational Software (3)** Corry

Theory and practice of creating educational software; psychological basis of using software in learning; instructional programs; authoring tools; artificial intelligence applications; interactive media. Students design and evaluate an educational program. Prerequisite: Educ 232 or permission of instructor.

236 **Critical Issues in Distance Education (3)** Staff

Historical, conceptual, theoretical, and practical issues associated with distance education as a foundation for research and practice in the domain of distance education as well as adult learning, educational systems design, and school administration and policy. Prerequisite: Educ 180 or equivalent.

237 **Instructional Needs Analysis (3)** Watkins

- An introduction to the role of instructional needs analysis and assessment. The design and development of instruction. Key elements of the instructional design cycle.
- Prerequisite: Educ 180 or equivalent.
- 238 **Technology and Disabilities (3)** Staff
- Assistive technology as it impacts the lives of people with disabilities, including the performance of tasks related to employment, education, and activities of daily living.
- Prerequisite: Educ 180 or equivalent.
- 239 **Learning Technologies and Organizations (3)** Staff
- The role of learning technology in organizations, learning in the workplace, and knowledge management in corporations, schools, and universities. Prerequisite: Educ 180 or equivalent.
- 240 **Proposal Writing (3)** Staff
- The preparation of proposals for educational, business, and industrial applications, including those submitted for funding. Many styles and formats are illustrated. Each student will prepare a proposal in cooperation with an organization or agency.
- 242 **Fundamentals of Educational Leadership** Brown, Roach, DeSander
 and the Change Process (3)
- Current leadership theory and systems behavior in the context of administrative practice in educational settings. Key elements of leadership and management. The impact of context, culture, power, politics, change, communications, and organizational learning on administration. (Fall)
- 243 **Human Relations Diversity (3)** Staff

- Application of current theory and research findings in human relations to staff motivation, change, conflict management, and communication techniques for working with individuals and groups within organizations. (Summer)
- 244 **Managing Multicultural Environments (3)** Staff
Application of multicultural research in identifying key elements for managing diverse school environments, communicating with families, planning professional development activities, and increasing student learning. (Spring)
- 246 **Administrative Issues in Education (3)** Roach, Ehrensall
The impact of major social, political, economic, and education issues on the role of school leaders and the delivery and quality of programs and services. (Spring)
- 248 **Supervision and Evaluation of Instruction (3)** Lemasters, English
The roles and functions of educational leaders in the areas of curriculum, staff development, instructional supervision, and evaluation of personnel. Theory and practice to increase teacher effectiveness and improve student learning through supervisory strategies. (Fall)
- 259 **Site-Based Leadership: K–12 (3)** Tekleselassie
A general introduction to the principalship. Stresses leadership theory, roles, and management tasks in instruction, curriculum, budget, staff development, supervision, interagency services, student learning, and policy considerations. Site-based management and communication within a changing and diverse school environment. (Fall)
- 260 **Supervision in the Elementary and Secondary School (3)** Staff

For experienced teachers and administrators. Legal and policy basis for personnel evaluation and supervisory practices. Review of modern supervisory concepts, including practices in schools. Prerequisite: Educ 248. (Spring)

261 **Developing Effective Training with Technology (3)** Staff

Development of skills in planning and producing effective technology-rich training that meets institutional and organizational needs.

262 **Computer Interface Design for Learning (3)** Corry

Human-computer interaction, both in general and with emphasis on issues in education. General design aspects; theories, principles, and guidelines related to human-computer interaction.

263 **Instructional Design (3)** Corry

Designing, implementing, and evaluating instructional strategies for learners. Assessing needs, writing objectives, selecting curriculum/content, selecting and implementing methods and techniques, selecting appropriate devices and evaluating instruction. Prerequisite: Educ 180 or equivalent.

264 **Advanced Instructional Design (3)** Watkins

Development of a prototype instructional design project and documentation report requiring rapid design and development strategies.

265 **Developing Multimedia Materials (3)** Milman

The design, development, integration, and use of multimedia resources in education and training settings. Students examine and critique multimedia technologies, develop instructional materials, and create a unit or module that applies instructional design theory.

- 266 **Developing Digital Professional Portfolios (3)** Milman
- Students create a digital professional portfolio, using advanced skills in the design, development, integration, and use of multimedia resources.
- 267 **Master's Internship in Higher Education Administration (3 to 6)** Staff
- Supervised practical experience in college student development programs. Admission by permission of instructor. (Fall, spring, and summer)
- 268 **Leadership and Education (3)** El-Khawas, English, Roach
- A general introduction to issues of leadership applicable to education settings and to key features of educational organization, including schools, school systems, colleges and universities, and advocacy organizations. Leadership as a process and set of skills. The interaction between leadership styles and organizational contexts.
- 271 **Education Policy (3)** Nakib, Roach, Futrell
- An introduction to the development, implementation, and assessment of education policies at national, state, and local levels. (Fall and spring)
- 272 **Educational Planning (3)** Lemasters, Tekleselassie
- An examination of the planning movement in education: its historical development and the recent shift in premises, context, and expectations. Different approaches to the planning process; its role in research; and overview of main analytical techniques currently in use.
- 273 **Foundations of College Student Development (3)** Staff
- College student development theories, practices, and problems, including historical overview and human development theories related to college students.
- 274 **Group and Organizational Theories (3)** Staff

Review of major organizational theories inside and outside higher education, including systems, institutional, cultural, cognitive, environmental, ecological, as well as power and influence.

275 **School Finance (3)** Staff

The financing of public elementary and secondary education in the United States; current revenue sources, distribution decisions, and trends in the fiscal operations of schools. Litigation, finance policies, and equitable investments of public monies. (Spring)

276 **School–Community Relations (3)** Staff

The purpose, scope, essential elements, and impact of a successful school–community relations program. Community power structures, the roles of policy and leadership, communication techniques for interacting with various audiences and the media, evaluation of public relations and marketing for educational institutions. (Fall)

277 **Dynamics of Change (3)** Staff

An analysis of the process of change, particularly as it relates to educational policy. Comparison of theories; analytical tools; historical precedents; examples of federal education policies.

278 **School Law and Policy (3)** Ehrensall

The legal basis of education and public schools in the United States. Constitutional provisions and federal statutes that guide school law. Legal factors that influence school policy. Consideration of practical school situations for legal implications, development of skills to research legal issues affecting schools, and preventive law measures. (Spring)

- 279 **Practicum in Supervision** (3 to 6) Staff
- Practical experience in supervision of instruction. Admission by permission of instructor. (Fall and spring)
- 280 **Internship in Supervision and Instructional Leadership** (3 to 6) Staff
- Service in a school situation directed by the University's faculty and school systems; integration of theory and practice.
- 281 **Program Evaluation: Theory and Practice** (3) Staff
- Introduction to the theory of social program evaluation, alternative evaluation models and methodologies, and the political and social contexts of evaluation.
- 282 **Managing College Student Services Programs** (3) Staff
- An overview of student affairs administrative practices, including planning models, budgeting, policy development, program development, facility management, and team building. Admission by permission of instructor. (Fall)
- 283 **History of Higher Education** (3) Staff
- History, philosophy, scope, purpose, present status, programs, and trends in higher education in the United States. (Fall)
- 284 **Administration of Higher Education** (3) Staff
- Government, organization, and administration of colleges and universities; duties of trustees and administrators. (Spring)
- 285 **Education and National Development** (3) Cummings
- In terms of the basic assumption that education contributes to national development, the course examines the role education plays in the process of national development in advanced industrial societies and societies moving to industrialism.

- 286 **Interpretation in the Historic House Museum (3)** Stapp
Seminar integrating advanced practices of museum education with current scholarship in architectural history, material culture, and social history. Extensive use of Washington museum resources. Admission by permission of instructor. Same as AmSt 286. (Fall)
- 287 **Museums and Technology (3)** Staff
Applications of technology that link the public with the museum: Internet exhibitions, interactive computer programs, video conferencing, the electronic classroom. Guest lectures, field trips, and group projects. Same as MStd 287.
- 288 **Analysis of Education Policy Issues (3)** Rotberg, Nakib
Covers a range of education policy options, assessing their advantages and disadvantages based on evidence, and drawing implications for policy formulation. A critical approach is applied to the assigned readings, questioning the sources of evidence, appropriateness of analysis, and validity of the findings. Prerequisite: Educ 271, 295. (Spring)
- 290 **Leadership in Higher Education (3)** Staff
Cognitive leadership theory as articulated in higher education: what leadership is, how it works, how it is practiced, how it is considered by scholars and practitioners, and how it is researched. Case studies. Prerequisite: Educ 283, 284.
- 292 **Practicum in Educational Policy Program Evaluation (3 to 6)** Jackson and Staff
Supervised practical experience in field placements. Admission by permission of instructor. Prerequisite: Educ 281. (Fall, spring, and summer)
- 293–94 **Research and Independent Study (1 to 3)** Staff

- Individual research under guidance of a staff member. Program and conferences arranged with an instructor. (Academic year)
- 295 **Introduction to Quantitative Research (3)** Staff
- Development of a conceptual understanding of research design and quantitative analysis options for the consumer of research. Appropriate use of vocabulary and interpretation of research findings. Critique of research articles and/or development of a small-scale proposal. Prerequisite: Educ 212 or equivalent.
- (Fall, spring, and summer)
- 296 **Internship in Educational Technology Leadership (3)** Staff
- Students are assigned to a cooperating agency and work in consultation under the guidance of the course instructor. Admission by permission of instructor.
- 297 **Educational Technology Leadership Master's Project (1–6)** Staff
- Students design, develop, implement, and evaluate an individual project. Admission by permission of instructor.
- 298 **Introduction to Educational Statistics (3)** Dannels, Graham, Choi, Mueller
- Fundamentals of descriptive statistics and hypothesis testing; introduction to inferential statistics and research design, distinguishing between nonexperimental, quasi-experimental, and true experimental designs. Designed for those with little preparation in quantitative methods or who are not prepared for Educ 302.
- 299–300 **Thesis Research (3–3)** Staff
- 301 **Advanced Study: Ideas, Issues, and Practices in Education (3)** Staff

For precandidates for the Ed.D. Alternative means of responding to the complexities of the educational process. Topics vary but concern education as an individual process and as sociocultural preservation and renewal. May be repeated for credit.

(Fall and spring)

302 Group Comparison Designs and Analyses (3)

Dannels, Graham, Choi, Mueller

Designs and analyses to assess differences for more than two groups when compared on one dependent variable. Fixed, random, and mixed effects ANOVA and ANCOVA models and multiple comparison tests. Nonparametric tests. Prerequisite: Educ 298 or equivalent.

307 Qualitative Research Methods (3)

Dannels, Graham, Wright

A general introduction to several major qualitative research traditions (e.g., biography, grounded theory, ethnography, phenomenology, and case study). Application of qualitative research design and procedures, including preliminary data collection, analysis, and writing.

310 Educational Measurement (3)

Choi

Classical and modern measurement theory, item response theory, and factor analysis. Educational and psychological instrument development and validation. Interpretation of scale scores and assessment of instrument adequacy. Prerequisite: Educ 302.

312 Predictive Designs and Analyses (3)

Mueller

Techniques used to assess how independent variables are related to one dependent variable. Simple regression, multiple linear regression, and logistic regression.

Appropriate research questions, data interpretation, and design. Prerequisite: Educ 302.

314 **Multivariate Analysis (3)**

Mueller, Choi

Techniques for assessment of relationships among multiple independent variables and dependent variables. Multivariate analysis of variance (MANOVA), multivariate analysis of covariance (MANCOVA), discriminant analysis, and exploratory factor analysis. Prerequisite: Educ 312.

316 **Structural Equation Modeling (3)**

Mueller

Multivariate techniques used for assessment of structural (causal) relations among latent (unobserved) variables with multiple observed indicators: observed and latent variable path analysis and confirmatory factor analysis. Latent means analysis and latent growth modeling. Prerequisite: Educ 312.

320 **The Politics of Education (3)**

El-Khawas

Examination of the contextual factors (political, economic, and historical) and the nature of political decision making on education issues, primarily at the state and local level. Prerequisite: Educ 271. (Spring)

321 **Economics of Education (3)**

Nakib

Economic analysis as it pertains to educational systems and their impact on economic growth. Economic aspects of the conduct and evaluation of policy. Economic principles and theories applied to education problems such as productivity and cost analyses. Prerequisite: Educ 271 and 302. (Spring)

322 **Education Policy Implementation (3)**

Nakib

The evolution and implementation of education policies. Policy implementation at various levels and types of educational systems. Policy is analyzed as a process and as it interacts with organizational, social, economic, and political factors and movements that can hinder or enhance its implementation. Prerequisite: Educ 271 or equivalent. (Fall)

323 **Policies of Education Equity (3)** Nakib

Analysis of the development, implementation, and evaluation of education equity policies, with consideration of their context, formulation, and application.

Prerequisite: Educ 271.

324 **Ethnographic Research Methods (3)** Wright

Techniques used to examine systematically the contemporary daily life of a given group in its natural setting, focusing on culture—the recurring patterns of thought and social relations. Issues of research design and data collection and analysis.

Prerequisite: Educ 307.

326 **Phenomenological Research Methods (3)** Wright

Techniques used to elicit and recognize perceptions, interpretations, motives, expectations, and imaginations. The framing of appropriate research questions, data collection and analysis, and the statement of conclusions. Prerequisite: Educ 307.

328 **Discourse Analysis (3)** Staff

Techniques used to examine verbal and nonverbal communication to understand identity, beliefs, intentions, relationships, and culture. The framing of appropriate research questions; data collection and analysis. Prerequisite: Educ 307.

329 **Seminar in Program Evaluation (3)** Staff

- Contemporary problems and issues in evaluation of social programs: design, implementation, analysis, and utilization. Prerequisite: Educ 281.
- 330 **Survey Research Methods (3)** Dannels
- Techniques used to collect an array of information from a large number of people through structured interviews and mailed, e-mailed, or web-based questionnaires. Defining the research question and design; sampling, survey development, data collection procedures, pretesting, and data handling. Prerequisite: Educ 302, 307.
- 331 **Personnel Administration (3)** Staff
- Human resource management: planning, recruitment, selection, placement and induction, staff development, rewards, and negotiations. Issues and legislation that influence personnel functions and policy; communication skills for human resource leadership. (Fall)
- 332 **Case Study Research Methods (3)** Swayze
- Techniques used to examine one or a few complex cases, collecting data from several types of sources and usually by several methods. The course will cover design, data collection, and data analysis/integration. Prerequisite: Educ 307.
- 334 **Doctoral Internship in Educational Policy (3 to 6)** Staff
- Supervised internship in education or human services settings for advanced doctoral students. (Fall, spring, and summer)
- 337 **Critical Review of Educational Leadership Literature (3)** Lemasters, Roach
- The techniques, tools, and presentation of critical reviews and syntheses of educational literature used to inform forthcoming research. Systematic mapping of what is known and deriving research questions, conceptual frameworks, and

applicable methods. Prerequisite: an approved dissertation topic or permission of instructor.

340 **Methods of Policy Analysis in Education (3)** Futrell, Rotberg

Methods of analysis used in the study of educational policy issues. Case studies on a range of policy issues and trends, including testing and accountability, school finance, school choice, and the federal role. Prerequisite: Educ 271, 295. (Fall)

345 **Advanced Studies in Educational Policy Analysis (3)** Rotberg

The process by which federal policy is made and implemented by states and school districts. Case studies. Assumptions and objectives; criteria for assessing effectiveness; and federal, state, and local roles. Prerequisite: Educ 271. (Spring)

353 **Seminar: Higher Education Administration (3)** Staff

354 **Seminar: Administration and Supervision (arr.)** Ehrensall

355 **Seminar: Applied Educational Administration (3 to 6)** Lemasters

Application of the theories and principles of administration to public and private schools. Field experience in a phase of administration and supervision. Admission by permission of instructor.

369 **School Business Management (3)** Staff

Management and control of the business functions of school districts. Assessing, planning, developing, and presenting educational budgets; the legal contexts affecting school business management. Risk management and school-site budgeting. (Fall)

370 **Higher Education Policy (3)** El-Khawas and Staff

- Assessment of policies that impact higher education, including the relationship of K–12 policy to higher education. Policy networks and mechanisms of policymaking. Policy development and assessment. (Spring)
- 372 **Doctoral Internship in Higher Education Administration** (3 to 6) Staff
Service in a higher education situation directed by the University and the cooperating institution to integrate theory and practice. Admission by permission of instructor. (Fall, spring, and summer)
- 373 **The Community/Junior College** (3) Staff
The two-year college as it relates to secondary education, four-year colleges, and universities. Objectives, curricula, students, faculty, legal concerns, and special problems of two-year colleges.
- 374 **Current Issues in Higher Education** (3) Staff
Prerequisite: Educ 283, 284. (Summer)
- 378 **Financing Higher Education** (3) Staff
Analysis of private, state, federal, and other revenue sources; strategic planning, program budgets, and financial methods and practices. (Fall)
- 379 **Administration and Governance of Two-Year Colleges** (3) Staff
A study of the community/junior college, focusing on administrative and governance patterns and national, regional, state, and local influences, as well as the theory and structure of two-year college organization.
- 380 **Legal Problems in Higher Education** (3) Staff

- Investigation of legal problems in higher education related to the legal structure of higher education, religious concerns, students, faculty, and academic programs.
(Summer)
- 381 **College and University Curriculum (3)** Staff
Development, patterns, creative design, issues, problems, evaluation, and trends in the higher education curriculum. (Summer)
- 384 **College and University Governance (3)** Staff
Organizational and administrative structures, patterns, and relationships in higher education. Prerequisite: Educ 284.
- 385 **Problems and Practices in Educational Administrative Organization (3 to 6)** Brown
Application of principles and practices concerned with change and evaluation of educational administration.
- 387 **Internship: Administration (3 to 6)** Howerton, Lemasters
Service in an educational institution or education-related program directed by the University's faculty.
- 388 **Case Studies in Higher Education Administration (3)** Staff
An analysis of case studies related to administrative functions in colleges and universities.
- 390 **Pre-Dissertation Seminar (3 to 6)** Staff
Required of all departmental Ed.D. degree candidates. Approval of the dissertation research proposal by the dissertation committee is necessary for successful completion of the seminar. Admission by permission of instructor.

391 Dissertation Research (3 or 6)

Staff

Prerequisite: Educ 390.

ELECTRICAL AND COMPUTER ENGINEERING

Professors W.K. Kahn, H.J. Helgert, R.H. Lang, N. Kyriakopoulos, T.N. Lee, E. Della Torre, R.J. Harrington, W. Wasylkiwskyj, M.H. Loew, R.L. Carroll, Jr., M.E. Zaghloul, M. Pardavi-Horvath, B.R. Vojcic, D. Nagel (*Research*), J.N. Pelton (*Research*), K.B. Eom, C.E. Korman (*Chair*), T. El-Ghazawi, L. Bennett (*Research*), T.J. Manuccia, S. Subramaniam, B. Myklebust (*Research*)

Associate Professor M. Doroslovacki

Assistant Professors J.M. Zara, S. Ahmadi (*Research*), M.W. Kay, V. Zderic

Adjunct Professors A. Schneider, D. Smith

Professorial Lecturers L.J. Ippolito, M.R. Berman, M.L. Picciolo, I. Martinez, S. Hussein, A. Mehrotra, J. Myklebust, A. Veronis

Lecturers C. Wu, S. Zhang, K. Kern

See the School of Engineering and Applied Science for programs leading to the master's, professional, and doctoral degrees. The department also offers certificate programs in computer architecture and networking, optical communications and networks, telecommunications networks, telecommunications security and electronic warfare, and wireless and mobile networks.

201 Microcomputer Systems Architecture (3)

El-Ghazawi and Staff

Advanced microprocessor-based systems CISC and RISC. Buses, timing, and system interface protocols. Advanced memory designs. Multilevel cache designs.

Architectural support for memory management, protection, task switching, and

exception handling. Multiprocessor systems. Prerequisite: ECE 181. (Fall and spring)

202 **Linear Systems Theory** (3) Kyriakopoulos and Staff

Introduction to linear systems theory. Topics include linear vector spaces and linear operators, mathematical representation of dynamic linear systems, concept of state and solution of the state equation, controllability and observability, canonical forms of the state equation, state feedback, and state estimation. Prerequisite: ECE 12. (Fall)

203 **Stochastic Processes in Engineering** (3) Vojcic and Staff

Basic concepts of modeling of random phenomena in electrical and computer systems: probability framework, stationarity, linear filtering. Optimization of discrete and continuous stochastic processes. Elements of performance analysis. Prerequisite: ECE 12, ApSc 115. (Fall and spring)

204 **Embedded Systems** (3) El-Ghazawi and Staff

Architectural advances and instruction sets for embedded microprocessors. Real-time operating systems and real-time scheduling, use of pre-designed software and hardware cores. Sensors, actuators, and data acquisition. System-on-chip (SoC). Design case studies. Prerequisite: ECE 201. (Fall and spring)

206 **High-Performance Processors** (3) El-Ghazawi and Staff

Processor microarchitecture and instruction-level parallelism. Superpipelines and superscalar processors. Multiple-instruction fetching, aligning, merging, and issuing. Hardware and software solutions to structural and data and control hazards. Branch

- prediction and static and dynamic speculation. Register renaming, Tomasulo's algorithm. VLIWs. Prerequisite: ECE 201. (Spring)
- 207 **Parallel Computer Architecture (3)** El-Ghazawi and Staff
Architectural classifications and taxonomies of parallel computers; enabling technologies, including advanced processor concepts, interconnection networks, high-speed memory architectures and protocols; parallel performance and scalability; and introduction to parallel algorithms and parallel programming. Prerequisite: ECE 201 (Fall)
- 208 **Digital Image Processing (3)** Loew and Staff
Properties of images and visual systems. Image acquisition, sampling, quantization. One- and two-dimensional image transform techniques; enhancement and restoration. Image coding and data compression. Segmentation, representation, boundary and shape, texture, matching. Image understanding. Prerequisite: ECE 219. (Spring, odd years)
- 209 **Compression Techniques for Data, Speech, and Video (3)** Eom and Staff
Lossless and lossy coding theorems, rate distortion bound. Data compression algorithms: Huffman coding, run-length coding. Differential coding. Transform coding. Voice, audio, image and video coding techniques: CELP, JPEG, MPEG, MP3. Data coding standards: G.722, G.726, G.728, H.261, H.323. Prerequisite: ECE 203, 211. (Spring)
- 210 **Applied Electromagnetics (3)** Lang and Staff
Review of Maxwell's equations; electromagnetics of circuits, plane wave propagation; transmission lines; waveguides; radiating systems; receiving antennas

- and pattern reciprocity, array antennas; electromagnetic properties of materials: conductors, crystals, devices; optical transmission. Prerequisite: ECE 32. (Fall)
- 211 **Signals and Transforms in Engineering (3)** Wasyliwskyj and Staff
Representation of discrete and analog signals as sums of canonical elementary functions; normal equations and the LMS approximation theory, singular value decomposition for discrete and continuous signals; application of classical transform theory to the study of linear systems. Prerequisite: ECE 12; ApSc 114.
(Fall and spring)
- 213 **Modeling of VLSI Circuits (3)** Zaghloul and Staff
Top-down ASIC-FPGA design methodology. Modeling of VLSI circuits using HDL. Behavioral, structural, and RTL modeling techniques; validation and verification techniques. Introduction to logic synthesis. Intellectual property usage. Students design and simulate a project using state-of-the-art commercial VLSI CAD tools. Prerequisite: ECE 126. (Fall)
- 214 **High-Level VLSI Design Methodology (3)** Zaghloul and Staff
High-level ASIC-FPGA design methodology. RTL modeling of VLSI circuits, using HDL for synthesis. Detailed discussion of logic synthesis. Architectural tradeoff for large VLSI circuits. Advanced optimization techniques. VLSI design flow, using the state-of-the-art, front-end design entry and simulation tools and back-end logic synthesis. Prerequisite: ECE 213. (Spring)
- 215 **Introduction to MEMS and NEMS (3)** Zaghloul and Staff
MicroElectroMechanical Systems. Micro/nano fabrication techniques, bulk micromachining, surface micromachining. Examples of mechanical sensors and

actuators, examples of microsystems, interface circuits and MEMS applications. Use of the CAD tools to design MEMS devices. May be taken by undergraduates.

Prerequisite: ECE 126. (Fall)

216 **RF/VLSI Circuit Design (3)** Zaghloul and Staff

Introduction to radio frequency systems: RF design, noise, amplifiers, specifications, matching concepts, mixers, oscillators, system-level design. Prerequisite: ECE 126.

(Spring, even years)

217 **Neural Networks and Applications (3)** Zaghloul and Staff

Theory of neural network models, relation to biological models. Examples of known models. Possible applications of neural networks. Computational intelligent systems, digital vs. analog approaches. Building blocks. Examples on realized neural networks.

(Fall, even years)

218 **Advanced Analog VLSI Circuit Design (3)** Zaghloul and Staff

MOS technology: building blocks, devices, capacitors, limitations. Operational amplifiers and other analog systems. Layout examples and design principles. Mixed-signal A/D and D/A. Students use the CAD VLSI laboratory to design and simulate circuits. Prerequisite: ECE 126. (Spring, odd years)

219 **Computational Techniques in Electrical Engineering (3)** Vojcic and Staff

Introduction to linear algebra and vector spaces as applied to networks and electrical systems. Orthogonal bases, projections, and least squares. Fast Fourier transforms.

Eigenvalues and eigenvectors with applications. Computations with matrices.

Constrained optimization in electrical systems. Network models and applications.

Prerequisite: ECE 12, ApSc 114. (Fall and spring)

- 220 **Pattern Recognition (3)** Loew and Staff Random vectors, transformations. Hypothesis testing, error probability, sequential methods. Bayes, other linear classifiers. Discriminant functions, parameter estimation, learning, and dimensionality reduction. Nonparametric methods; clustering; feature selection and ordering. Computer applications and projects. Prerequisite: ECE 203. (Fall, odd years)
- 221 **Introduction to Physical Electronics (3)** Korman and Staff Theoretical principles underlying the operation of electronic devices. Postulates of quantum mechanics: wave-particle duality, uncertainty relations, electronic band structure. Free-carrier statistics; electron-photon interaction. Physical principles of semiconductor and optoelectronic devices. Prerequisite: ECE 210. (Fall, odd years)
- 222 **Introduction to High-Performance Computing (3)** El-Ghazawi and Staff Taxonomy and classifications of computers and parallel computers. Parallel thinking and parallel algorithms. Domain decomposition and load balancing. Programming parallel computers using the message passing, global address space, and partitioned global address space paradigms. Prerequisite: graduate standing in science or engineering or consent of instructor. (Fall)
- 223 **Introduction to Nanotechnology (3)** Zaghloul and Staff Review of solid state physics, nanoparticles, carbon nanostructures, nano-electronics, quantum structures, self-assembly, and catalysis. Measuring properties of nanostructures; nano-machines and devices. Prerequisite: ECE 221. (Spring, even years)
- 225 **Device Electronics (3)** Korman and Staff

- Semiconductor device concepts; doping, drift diffusion, recombination. Analysis of Schottky and Ohmic contacts, *pn* junctions, MOS systems. Modeling and analysis of semiconductor devices such as MOSFET and bipolar transistors. Hot electron and short and narrow channel effects. Prerequisite: ECE 221. (Spring)
- 226 **Fiber and Integrated Optics (3)** Wasyliwskyj and Staff
- Propagation of light in optical fibers and planar waveguides, absorption and material dispersion effects, polarization, birefringence, spatial and temporal coherence. Components in fiber optic networks: directional couplers, power splitters, tunable filters and diffraction gratings. Prerequisite: ECE 210. (As arranged)
- 227 **Grid and Network Computing (3)** El-Ghazawi and Staff
- Local, regional, and global computational grids, distributed large-scale computations. Network protocols, quality-of-service and security issues. Grid infrastructure and middleware and scheduling. Distributed algorithms and programming tools. Computational versus data grids. System area networks and clusters. Prerequisite: ECE 207, 248. (Fall)
- 230 **Multimedia Processing (3)** Eom and Staff
- Introduction to multimedia. Multimedia formats, conversion, and combinations. Delivery and trends. Servers and networks. Hardware and architecture. End-user devices. Digital libraries, video conferencing and collaboration. Educational and health applications. Case studies and trials. Prerequisite: ECE 201. (Spring)
- 231 **Applications of MEMS and NEMS Devices (3)** Zaghloul and Staff
- The design of functional board-level electronic systems involving MEMS devices. Available and emerging MEMS and their use in multidisciplinary system-level

- applications, including automobile, aerospace, communication, chemical, medical and other industries. Microsensors and microsystem applications. Prerequisite: ECE 215. (Spring, odd years)
- 232 **Applied Magnetism (3)** Pardavi-Horvath and Staff
Classification of magnetic materials. Magnetic measurements. Soft and hard magnetic materials. Applications to microwave, magnetic recording, permanent magnets, magneto-optics, magnetostrictive devices. Magnetic sensors. Electric power. Superconducting devices. Prerequisite: ECE 210. (Spring, even years)
- 233 **Introduction to Microwave Engineering I (3)** Kahn and Staff
Transmission lines, scattering parameters, microwave networks, resonators. Modes in uniform waveguides, general characteristics of waveguide junctions. Transfer representations, filters, couplers, symmetrical waveguide junctions. Prerequisite: ECE 210. (Fall, even years)
- 234 **Introduction to Microwave Engineering II (3)** Wasyliwskyj and Staff
Active microwave components, amplifiers, oscillators, and mixers. Design of microwave amplifiers and oscillators, microwave transmitters and receivers. Introduction to microwave systems: radar, wireless communication systems, and radiometer systems. Prerequisite: ECE 233. (Spring, odd years)
- 235 **Antennas (3)** Kahn and Staff
Antenna circuits, radiation pattern, reciprocity, gain, receiving cross-section, scattering by antennas, mutual coupling, arrays. Polarization. Radiation from current distributions, equivalent aperture currents, dipoles, patch antennas, large phased arrays. Prerequisite: ECE 210. (Spring, odd years)

236 **Electromagnetic Radiation and Scattering (3)** Wasyliwskyj and Staff

Alternative representations of solutions to Maxwell equations, Fourier transforms and spherical mode representations, field equivalence principles, dyadic Green's functions, radiation and scattering by simple shapes, geometrical theory of diffraction, integral equations and the moment method. Prerequisite: ECE 210, 211. (Spring, odd years)

237 **Waves in Random Media (3)** Lang and Staff

Propagation and scattering of electromagnetic, optical, and acoustic waves in random media, scattering from rough surfaces and randomly distributed particles, turbulence. Applications to propagation through rain and fog. Laser beam scintillations, remote sensing, and communications channel modeling. Monte Carlo simulation. Prerequisite: ECE 203, 236. (Fall, odd years)

238 **Remote Sensing (3)** Lang and Staff

Active and passive remote-sensing systems: scatterometers, real-aperture imaging, and synthetic-aperture radars. Sensing of surface, subsurface, and atmospheric parameters at microwave, infrared, and optical frequencies. Analysis of radiometric techniques using radiative transport theory, inverse scattering methods, profile inversion. Prerequisite: ECE 210. (Spring, even years)

239 **Numerical Electromagnetics (3)** Wasyliwskyj and Staff

Numerical methods for the solution of electromagnetic scattering and radiation problems. Major techniques: method of moments, T-matrix and finite element methods, geometrical theory of diffraction and hybrid approaches to solve scattering

and radiation by wire structures, surfaces, and composite bodies. Prerequisite: ECE 210, 211, 219. (Fall, even years)

241 **Information Theory (3)** Vojcic and Staff

The concepts of source and channel. Measure of information, entropy, mutual information. The noiseless coding theorem. The noisy coding theorem. Channel capacity: symmetric and nonsymmetric channels, Gaussian and binary symmetric channels. Rate-distortion theory. Basics of multiple-user information theory.

Prerequisite: ECE 203. (Spring, even years)

242 **Error Control Coding (3)** Helgert and Staff

Algebraic coding theory: finite fields, linear block codes, cyclic and Reed–Solomon codes. Error detection using CRC codes. Convolutional codes and trellis-coded modulations: structure, properties, performance bounds. Capacity achieving codes; soft-input–soft-output decoding; computationally efficient decoding algorithms.

Prerequisite: ECE 203. (Fall)

243 **Communication Theory (3)** Vojcic and Staff

Principles of digital communications. Channels, digital modulation; optimum receivers and algorithms in the AWGN; coherent, non-coherent, and fading channels. Correlation detectors, matched filters; diversity. Bounds on performance of communications, comparison of communications systems and implementation issues.

Prerequisite: ECE 203. (Spring)

245 **Statistical Signal Estimation (3)** Doroslovacki and Staff

Minimum variance unbiased estimation. Cramer–Rao bound, statistical modeling, sufficient statistics, maximum likelihood estimation, efficient estimators, least

- squares. Bayesian estimators. Wiener and Kalman filters, complex data and parameters. Applications to radar, speech, image, biomedicine, communications, control. Prerequisite: ECE 203, 211, 219. (Fall, odd years)
- 246 **Digital Communications (3)** Vojcic and Staff
- Digital coding of waveforms: Nyquist criteria, pulse shaping and intersymbol interference. Partial response signaling. Equalization of distorted channels. Generation of carrier phase reference using phase-locked loops. Maximum-likelihood and practical algorithms for estimation of carrier phase and symbol timing. Channel state estimation. Prerequisite: ECE 243. (Fall, odd years)
- 248 **Introduction to Computer Networks (3)** Vojcic and Staff
- Types of networks. Circuit and packet switching. Layered network architectures. Electrical interfaces. Parity checking and CRC error detection codes. Automatic-repeat-request protocols. Routing. Flow and congestion control. Multiple-access protocols. LAN standards. Internetworking and transport layer protocol. Prerequisite: ApSc 115. (Fall and spring)
- 249 **Network Performance Analysis (3)** Subramaniam and Staff
- Telecommunications traffic models: arrival and service time distributions, Poisson and Erlang formulas. Topological design algorithms. Delay and blocking models and probabilities for packet switched networks. Routing, relaying, and flow control algorithms: delay and cost minimization, throughput optimization. Prerequisite: ECE 203 and any of ECE 248, 260, or 346. (Fall)
- 250 **Information Security (3)** Helgert and Staff

- Speech and data scrambling. Linear and nonlinear transformations. Cryptographic techniques. Block and stream ciphers. The Data Encryption Standard (DES). Key management, digital signatures, message authentication, hash functions. Public key algorithms. Prerequisite: ECE 211. (Fall)
- 251 **Telecommunication Switching Systems (3)** Helgert and Staff
- Circuit, packet and cell switching. Routing and relaying algorithms. Space and time division switching. Multistage switching networks. Storage, delay, blocking and analysis. Digital cross connects, add/drop multiplexers. Digital switching systems. Network timing and synchronization. In-band and common channel signaling networks. Prerequisite: ECE 249. (Spring, odd years)
- 252 **Digital Signal Processing Techniques (3)** Kyriakopoulos and Staff
- Signal and system representation, sampling and quantization, transform techniques. Recursive and nonrecursive digital filter design, recursive estimation, linear predictive filtering. Fast algorithms for signal processing. Current topics. Prerequisite: ECE 117 or 211, and 203. (Fall)
- 253 **Mobile Communication Systems (3)** Vojcic and Staff
- Mobile channel characterization. Modulation and coding techniques. Code division multiple access. Fading countermeasures; coding, equalization, and multiple transmit/receive antennas. Power control. Capacity of cellular and ad hoc networks. Structure and evolution of mobile communications networks. Evolving technologies and standards. Prerequisite: ECE 243. (Spring, even years)
- 254 **Introduction to Radar Systems (3)** Wasylkiwskyj and Staff

The radar range equation. Radar cross section of targets, target detection and parameter estimation, detection in clutter. Resolution, ambiguities, and signal design. Moving-target indicators. Pulse Doppler radar. Radar antennas, phased arrays. Synthetic aperture and space-based radar. Prerequisite: ECE 32, 203.
(Fall, odd years)

255 **Optical Communication Networks (3)** Subramaniam and Staff

Wave propagation through fiber, dispersion, polarization. Multiplexing techniques, WDM. Optical networking components. Optical transmission systems design. All-optical networking, broadcast star and wavelength routing networks. Performance analysis, survivability, control and management. Optical access networks.
Prerequisite: ApSc 115. (Fall, even years)

256 **Wavelets and Their Applications (3)** Doroslovacki and Staff

Time-frequency analysis. Continuous, discrete, and discrete-time wavelet transform. Multirate filter banks. Multiband wavelets, two-dimensional wavelets. Wavelet packets and matching pursuit. Wavelets in noise filtering, compression, modeling of fractals, communications, detection, adaptive systems, neural networks, and fast computation. Prerequisite: ECE 211, 252. (Spring, odd years)

257 **Code-Division Multiple Access (3)** Vojcic and Staff

Spread-spectrum transmission; direct sequence and frequency hopping. Conventional code division multiple access. Multi-user detection and capacity limits for multi-user communications. High-capacity multi-user communications. Applications to mobile communications and cellular networks. 1xEVDO, cdma2000. Prerequisite: ECE 243.
(Spring, odd years)

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| 258 | Propagation Modeling in Wireless Communications (3) | Lang and Staff |
| | Wireless communication channel modeling, propagation mechanisms, terrestrial fixed links, satellite fixed links, macrocells, fading models, microcells, picocells, diversity, equalizers. Prerequisite: ECE 32, ApSc 115. (Fall, even years) | |
| 259 | Wireless Networks (3) | Vojcic and Staff |
| | Wireless channels and transmission fundamentals. Wide area networks: CDMA (UMTS/cdma2000) and OFDMA-based networks. Physical, MAC, and link layer protocols for wireless networks. Satellite systems. Broadcast systems. Wireless LANs, sensor and ad-hoc networks. Mobility support: handoffs and Mobile IP. Prerequisite: ECE 144. (Spring) | |
| 260 | Information Transmission Systems (3) | Helgert and Staff |
| | Transmission media, signals, channels, noise. A/D conversion, data compression, information exchange codes. Carrier modulation, modems and standards. Baseband transmission and codes, synchronization and timing. Multiplexing. Inverse multiplexing. Transmission impairments, error control procedures. Prerequisite: ECE 143. (Fall) | |
| 261 | Electric Power Generation (3) | Harrington and Staff |
| | Overview of primary traditional and alternative energy sources. Analysis of machinery employed in energy conversion processes. Effect of independent power producers on long-term and short-term stability of large grids. Safety issues regarding high voltage and current exposure. Prerequisite: ECE 178. (Spring, odd years) | |
| 262 | Power Electronics (3) | Harrington and Staff |

- Review of power semiconductors and their application to electric power supply, frequency control, and uninterruptible power supplies and to the design of HVDC power transmission. Application of multiphase power electronic circuits for speed and torque control of AC and DC machines and for industrial processes. Prerequisite: ECE 177. (Fall, even years)
- 264 **Space/Time Adaptive Processing for Radar (3)** Wasyliwskyj and Staff
Introduction to beam forming and space/time adaptive processing: spatial filtering; conventional and adaptive beam forming; space/time signal environments, metrics, computational issues, and advanced algorithms and analysis. Prerequisite: ECE 254. (Spring, even years)
- 266 **Power System Control and Security (3)** Harrington and Staff
Analysis of AC networks, load flow, economic dispatch, voltage and frequency control. N-1 contingency and its role in assessing and maintaining system integrity. Analysis of loss of critical generating units and transmission capabilities under severe threats. Rapid restoration techniques based on historical data and heuristic approaches. Prerequisite: ECE 178. (Fall, odd years)
- 269 **Developing Trends in Electrical Power Networks (3)** Harrington and Staff
Environmental issues regarding generation, transmission, and distribution of electric power; nuclear waste disposal; atmospheric pollution and amelioration. Effects of high electric and magnetic fields on biological organisms. Power line carriers for telecommunication networks. (Spring, even years)
- 272 **Computer Control Systems (3)** Carroll and Staff

Analysis of automatic control systems in which the control procedure uses on-line digital computation. Topics include single- and multirate sampling, z -transforms, responses of discrete systems, stability criteria, and discrete control design.

Prerequisite or concurrent registration: ECE 202. (Spring)

273 **System Optimization (3)** Carroll and Staff

Parameter optimization problems, theory of minima and maxima. Optimization problems for dynamic systems, calculus of variations, the maximum principle and the Hamilton–Jacobi equation. Optimization problems with constraints, optimal feedback systems. Numerical solution of optimal problems. Prerequisite: ECE 202. (Spring)

274 **Nonlinear Systems (3)** Carroll and Staff

Definition of linear and nonlinear systems; introduction to approximate analysis of nonlinear systems—describing functions, Krylov and Bogoliubov asymptotical method, and Tsytkin locus. Forced oscillations—jump resonance. Stability analysis—Liapunov criterion. Luré problem and Popov method. Prerequisite: ECE 202.

(Spring, even years)

275 **Adaptive Filtering (3)** Doroslovacki and Staff

Adaptation criteria. On-line adaptive filtering algorithms: least mean square and recursive least square. Adaptation in transform domain. Convergence of adaptive algorithms and tracking. Applications in system identification, adaptive channel equalization, interference cancellation and suppression, and adaptive antenna arrays.

Neural networks. Prerequisite: ECE 245. (Spring, even years)

277 **Satellite Communication Systems (3)** Helgert and Staff

- Low earth orbit and geostationary satellite systems. Transmission systems. RF link budgets. Modulation and multiplexing. Multiple access techniques: FDMA, TDMA, CDMA. Satellite transponders, antennas, and earth stations. Prerequisite: ECE 243. (Fall, odd years)
- 278 **Local and Metropolitan Area Networks (3)** Helgert and Staff
- LAN architectures, transmission systems, and media access procedures. LAN protocol standardization: the IEEE 802 standards. Logical link control, Ethernet, token bus, and token ring standards. FDDI and Fiber Channel. Wireless LANs: WiFi, HiPerLAN. Prerequisite: ECE 203, 346. (Fall, even years)
- 280 **Anatomy and Physiology for Engineers (3)** Loew and Staff
- Human anatomy and physiology from an engineering viewpoint. Analysis of functions of major physiological systems. Biopotentials, mechanics, gas exchange, chemical balance, electrical and chemical signaling, nervous control, voluntary and reflex factors. (Fall)
- 281 **Speech and Audio Processing by Computer (3)** Eom and Staff
- Acoustic sensor technologies and characteristics. Speech coding: waveform coding, voice source coding. Speech enhancement and noise reduction. Speech analysis and synthesis, audio formats and compression standards. Speech recognition: isolated word recognition, continuous speech recognition, language identification. Models for speech and audio. Prerequisite: graduate standing. (Fall)
- 282 **Medical Measurements (3)** Manuccia and Staff

- Theory of measurements in biological areas, techniques for electronic measurements on biological specimens. Experiments in acquisition, processing, and measurement of physiological signals, ECG, EEG, and EMG. Corequisite: ECE 280. (Fall)
- 283 **Medical Instrumentation Design (3)** Manuccia and Staff
Modern biomedical measurement techniques and instrumentation, including theory of data acquisition, biopotentials, biomedical signal processing, clinical laboratory instrumentation, respiratory system measurements, medical imaging, and prosthetic devices. Prerequisite: ECE 282. (Spring, even years)
- 284 **Biomedical Signal Analysis (3)** Loew and Staff
Origin, acquisition, and analysis of physiological signals. Deterministic and probabilistic modeling; fitting models; sequences and time series. Feature extraction from EEG and ECG; Fourier analysis and filtering; modeling. Noise and artifact removal and signal compensation. Prerequisite: ECE 282. (Spring)
- 285 **Medical Imaging I (3)** Zara and Staff
Principles of projection radiography, fluoroscopy, tomography, ultrasound and nuclear sources; biomagnetic imaging. Source and object; recorder resolution and noise; scatter and attenuation. Ultrasound techniques and instrumentation, including physics of ultrasound, transducers, ultrasound imaging, hemodynamics, Doppler techniques. Prerequisite: ECE 11, 282. (Spring, odd years)
- 286 **Clinical Medicine for Engineers (3)** Loew and Staff
Overview of clinical medicine with emphasis on those areas most affected by engineering and technology. Prerequisite: ECE 282. (Spring, even years)
- 287 **Rehabilitation Medicine Engineering (3)** Loew and Staff

- Cross-sectional view of those areas of medicine most involved with the treatment of handicapped individuals. Application of engineering theory and techniques to the rehabilitation of handicapped individuals. Major problem areas and general solutions, solutions to some specific problems. Prerequisite: ECE 282. (Spring, odd years)
- 289 **Telecommunications Security Protocols (3)** Helgert and Staff
- The OSI security architecture: services and mechanisms, risk analysis. Internet protocol mechanisms. Ipv4 and Ipv6 security, security associations, authentication, MD5. Encapsulating security payload. E-mail security: PGP, S/MIME, PEM, MSP. Secure voice communications algorithms. Security in Internet commerce: SSL, SET. Prerequisite: ECE 250, 346. (Spring, even years)
- 290 **Telecommunications Networks (3)** Helgert and Staff
- Traffic characterization: CBR and VBR sources. DSL systems. N-ISDN: physical layer interfaces, data link and network layer protocols. Common channel signaling. Frame Relay: protocol architecture, call control, LAPF, congestion control. SONET/SDH multiplexing. ATM networks. Multiprotocol label switching. Prerequisite: ECE 346. (Fall)
- 291 **Nanomagnetics (3)** Della Torre and Staff
- Physics of magnetism in solids, with emphasis on magnetic phenomena used in devices. Fundamental properties of magnetic materials. The origins of magnetism, demagnetizing fields, anisotropy, magnetostriction, domains and coercivity. Prerequisite: ECE 210. (Fall, odd years)
- 292 **Magnetic Hysteresis (3)** Della Torre and Staff

- Hysteresis models. Decomposition into irreversible and locally reversible magnetization. Aftereffect and accommodation. Vector models. Magnetostriction and magnetothermal effects. Prerequisite: ECE 210. (Spring, odd years)
- 293 **Image Synthesis (3)** Eom and Staff
- Image synthesis techniques, mathematical image models, image reconstruction techniques, color texture synthesis, synthesis of three-dimensional scenes.
- Prerequisite: ECE 203. (Spring)
- 294 **Real-Time DSP (3)** Doroslovacki and Staff
- Digital signals, binary number representation, fixed-point and floating-point DSP architectures. Q-format for data representation, bit allocation and arithmetic.
- Portability of arithmetic expressions: floating point vs. fixed point. Applications to signal parameter estimation, signal generation, filtering, signal correlation, spectral estimation (FFT). Prerequisite: ECE 201. (Spring, odd years)
- 295 **Electronic Warfare (3)** Helgert and Staff
- Electronic attack and protection of information. Countermeasures and counter-countermeasures. Electronic attacks on ranging and tracking radar systems, jamming and jamming defense. Electronic attack on communications systems. Defensive techniques, signal design, spread spectrum. Attack and defense of optical and high-energy systems. Prerequisite: ECE 243. (Spring, odd years)
- 297 **Special Topics (1 to 3)** Staff
- Topics to be announced in the Schedule of Classes. (Fall and spring)
- 298 **Research (arr.)** Staff

- Applied research and experimentation projects, as arranged. May be repeated for credit.
- 299–300 **Thesis Research (3–3)** Staff
- 306 **Advanced Topics in Computer Architecture (3)** El-Ghazawi and Staff
- Examples of topics are interconnection networks, fault tolerance, load balancing, workload characterization, and performance modeling of advanced computer systems. Prerequisite: ECE 206, 207. (Spring, even years)
- 319 **Controls, Systems, and Signal Processing Research (arr.)** Staff
- Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)
- 320 **Computer Vision (3)** Loew and Staff
- Image processing; edge detection, segmentation, local features, shape and region description in 2D and 3D. Insights from human vision studies. Representation for vision: object models, synthetic images, matching, gaps, algorithms. Interference, production system, syntactic networks. Planning spatial reasoning for robot vision. Prerequisite: CSci 270; ECE 220. (Spring, even years)
- 329 **Electromagnetic Engineering Research (arr.)** Staff
- Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)
- 335 **Signal Processing Antenna Arrays (3)** Wasyliwskyj and Staff
- Review of antenna theory; radiation and reception by array antennas; antenna arrays as multiport receivers. Angle-of-arrival estimation using MUSIC and related techniques. Application to communications and radar. Prerequisite: ECE 203, 235.

(Fall, odd years)

346 **Telecommunications Protocols (3)** Helgert and Staff

Protocol standards and standards organizations. Layered protocol architectures for telecommunications networks. The OSI reference model. Data link layer protocols: HDLC. Network and transport layer protocols in support of OSI: X.25, ISO 8072. TCP/IP. IPv6. Protocols for session, presentation, and application layers. Prerequisite: ECE 248. (Spring)

348 **The Internet: Design and Implementation (3)** Helgert and Staff

Physical architecture: transmission systems, bridges, gateways, routers, servers, and hosts. Service structures: NBP, NAP, ISP. Protocol architecture. Transmission, routing, and application protocols. The Web: CGI, HTTP, search engines, and browsers. Security: access control, firewall, packet filters, integrity mechanisms. Software issues. Prerequisite: graduate standing. (Fall)

358 **Electromagnetic Wave Propagation (3)** Wasylkiwskyj and Staff

Electromagnetic wave propagation in complex environments, with applications to communications and radar; terrestrial propagation models, satellite-to-ground propagation, effects of the atmosphere and the ionosphere, statistical and numerical models. Prerequisite: ECE 203, 210. (Spring, even years)

383 **Bioelectric Phenomena and Bioelectromagnetics (3)** Loew and Staff

Mathematical treatment of bioelectric phenomena: membrane, dynamics, potentials, and subthreshold effects; solid-state phenomena; nerve propagation. Electromagnetic interactions with biological systems; energy absorption and heat production;

- diagnostic and therapeutic applications of electromagnetic energy. Prerequisite: ECE 210, 283. (Fall, even years)
- 384 **Medical Imaging II (3)** Loew and Staff
Reconstruction algorithms and implementations for CT and MRI; PET and SPECT. Medical image analysis: enhancement, segmentation, computer-aided detection and diagnosis. Prerequisite: ECE 284, 285. (Fall, odd years)
- 385 **Special Topics in Medical Engineering (3)** Loew and Staff
Exploration of a current advanced topic in biomedical engineering. Topic to be announced in the Schedule of Classes. (Fall and spring)
- 390 **Colloquium (0)** Lang and Staff
Lectures by outstanding authorities in electrical and computer engineering. Topics to be announced each semester. (Fall and spring)
- 399 **Dissertation Research (arr.)** Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit.

ENGINEERING MANAGEMENT AND SYSTEMS ENGINEERING

Professors R.M. Soland, E.L. Murphree, Jr., H. Eisner, S. Sarkani, G. Frieder, T.A. Mazzuchi

(*Chair*), J.P. Deason, M.A. Stankosky, J.R. van Dorp

Associate Professors M.R. Duffey, H. Abeledo, J.A. Barbera, G.L. Shaw, J.J. Ryan

Assistant Professors A. Bada, E. Campos-Nanez, F. Fiedrich

Professorial Lecturers W.A. Goetz, F. Allario, C.R. Cothorn, D.J. Ryan, C.H. Voas, J.E. Collins,

M.G. Goode, F.A. Calabrese, J.F. Starns, R.C. West, R.E. McCreight, B.L. Lewis, J.E. Beach,

S.S. Gambhir, R.B. Garrity, C.H. Bixler, T.H. Holzer, J.R. McCumber, D.R. Gallay, G.D.

201	Quantitative Models in Systems Engineering (3)	Abeledo, Campos-Nanez, and Staff
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202 **Operations Research Methods (3)** Abeledo, Campos-Nanez, and Staff204 **Management of Engineering Contracts (3)** Murphree and Staff

Study of the total contracting process (including initial budget preparation and justification, execution of a contract, and administration of the contract to

- completion) considered from the viewpoints of the industrial and government buyer and the seller of technical materials and services. (Fall)
- 207 **The Human Resources Function for Engineering Managers (3)** Cosentino and Staff
- Principles, theory, and practical considerations of the human resources function, with applications for engineering management. Issues and case studies examined within the context of the totality of the process of management as well as the dynamics of human resources management. (Fall and spring)
- 208 **Stochastic Foundations of Operations Research (3)** Soland and Staff
- Topics in probability theory, stochastic processes, and statistical inference.
- Foundations of probability, conditional probability and expectation, Poisson processes, Markov chains, and Brownian motion. Prerequisite: ApSc 116 or permission of instructor. (Fall)
- 209 **Mathematics in Operations Research (3)** Abeledo and Staff
- Mathematical foundations of optimization theory: linear algebra, advanced calculus, convexity theory. Geometrical interpretations and use of software. Prerequisite: Math 33. (Spring)
- 210 **Engineering Law (3)** Stankosky and Staff
- Legal principles and procedures of interest to engineers. The American legal system, contracts and specifications, liability of professional engineers, product liability, agency relationships, patent and proprietary rights, special problems in research and development contracts. (As required)
- 211 **Organizational Behavior for the Engineering Manager (3)** Stankosky and Staff

- The behavior of individuals and groups in the context of technical organizations, focusing on relationships and interactions within the organization's operating activities. Individual and group development and motivation. Organizational structures and cultures. (Fall)
- 212 **The Management of Technical Organizations (3)** Stankosky and Staff
- The practice of management as applied within technical organizations. Includes history of the tradition and current effective practices, research findings, and case studies, with objectives of enhanced understanding of external and internal factors influencing organizational performance and leadership requirements. (Fall, spring, and summer)
- 216 **Research Methods for the Engineering Manager (3)** Ryan and Staff
- Advanced course in research, experimental, and statistical methods for engineering management. Prerequisite: EMSE 269 or permission of instructor. (Fall and spring)
- 217 **Fundamentals of Artificial Intelligence (3)** Stankosky and Staff
- History of AI, expert systems, knowledge representation, search and control techniques, natural language processing, computer vision, computer speech, knowledge-based systems, and evidential reasoning. Hands-on experience with a knowledge-based shell. (Spring)
- 218 **Management of Information and Systems Security (3)** Ryan and Staff
- Development and management of effective security systems. Includes information, personnel, and physical security. Emphasis on risk analysis for information protection. (Fall and summer)
- 219 **Object-Oriented Analysis and Design (3)** Bada and Staff

The object-relationship model and the object-behavior model. Managing complexity with views and high-level modeling in object-oriented systems analysis. The concepts, the method, and applications, including object-based and object-oriented languages. Prerequisite: EMSE 250. (On demand)

220 **Policy Factors in Environmental and Energy Management (3)** Deason and Staff

Exploration of the policy development process from several different but integrated perspectives. Focus on areas of environmental and energy management and use of current case studies to develop a framework of understanding to support decisions in a broad variety of management settings. (Fall, odd years)

221 **Environmental Management (3)** Deason and Staff

Technical, economic, political, administrative, and social forces influencing the quality of the environment and the use of resources. Government and industrial programs to combat pollution of the air, soil, and water; existing and pending pertinent legislation; theoretical aspects of specific management problems. (Fall)

222 **Energy Management (3)** Deason and Staff

Examination of the range of available energy resources, trends in their use, the programs and organizations that have developed and evolved to address problems associated with energy resource use. (Spring)

223 **Air Quality Management (3)** Deason and Staff

The nature of critical local, regional, continental, and global problems associated with air pollution and the historical evolution of such problems. The complex regulatory

- and institutional framework controlling air quality management in the U.S. Current air quality management concepts and processes. (Spring)
- 224 **Analytical Tools in Environmental Management (3)** Deason and Staff
- A survey course in environmental management, focusing on tools to assess the environment: cost benefit analysis, land use, comprehensive planning, Congressional activities, and environmental laws. The regulatory process as it relates to environmental management. Risk assessment and modeling approaches to solving environmental problems. (Spring, odd years)
- 225 **Hazardous Waste Management and Cleanup (3)** Deason and Staff
- Hazardous waste management and cleanup processes used in the U.S. and around the world. The roles of the relevant federal, state, and local government agencies; major hazardous waste laws and regulations. Planning, assessment, investigation, design, and construction phases of hazardous waste remediation projects.
- (Spring, even years)
- 226 **Water Quality Management (3)** Deason and Staff
- The nature of point and non-point sources of surface and ground water pollution and the statutory, regulatory, and institutional framework controlling water quality management activities in the U.S. Current approaches to water quality protection and enhancement. The role of engineered treatment processes in water quality management. (Fall)
- 227 **Analytical Tools for Energy Management (3)** Deason and Staff
- Analytical tools needed to manage energy resources at the facility level. Energy technologies: instrumentation, measurement, and control. Energy auditing;

conservation techniques, financial and economic analysis, and maintenance of energy budgets. Functions of an energy management office of a large organization.

(Fall, even years)

230 **Homeland Security: The National Challenge (3)** Shaw and Staff

The evolution of homeland security as a concept, legal framework, and redirection of national policies and priorities. Issues and problems of implementation. The terrorist threat and U.S. responses. Fundamental policy legislation and documents, such as national security strategies, homeland security decision directives, the NRP, and NIMS. (Spring)

231 **Program and Project Management (3)** Eisner and Staff

Problems in managing projects; project management as planning, organizing, directing, and monitoring; project and corporate organizations; duties and responsibilities; the project plan; schedule, cost, earned-value and situation analysis; leadership; team building; conflict management; meetings, presentations, and proposals. (Fall)

232 **Crisis and Emergency Management (3)** Barbera and Staff

Defining crises, emergencies, and disasters. Developing crisis, contingency, and incident management plans. The National Response Framework, National Incident Management System, organizing for response, managing the response organization, managing in a turbulent environment, crisis decision making and communication. (Fall)

233 **Information Technology in Crisis and Emergency Management (3)** Fiedrich and Staff

- The role of information in crisis and response management; determining disaster and crisis information requirements; information technologies applied to crisis, disaster, and emergency management; causes and effects of information breakdowns during crises and disasters. (Spring)
- 234 **Management of Risk and Vulnerability for Hazards and Terrorism (3)** Shaw and Staff
- Development of concepts required for risk-based planning and risk management. Objectives and methods for vulnerability assessment for natural disaster, technological hazards, and terrorist threats. Risk analysis, risk perception, risk communication, risk mitigation. (Fall)
- 235 **Systems Thinking and Policy Modeling I (3)** Campos-Nanez and Staff
- Introduction to systems thinking and the system dynamics approach to policy analysis, with applications to business management and public policy. Causal-loop and stock and flow models of business growth, technology adoption, and marketing. Use of role-based games to explain key principles of systems. Use of simulation software to model problems and case studies. (Fall)
- 236 **Systems Thinking and Policy Modeling II (3)** Campos-Nanez and Staff
- Case studies in dynamic policy analysis. Use of microcomputers in simulation. The class collectively models and simulates a social system to explore policy options. Prerequisite: EMSE 235. (Spring, odd years)
- 237 **Logistics Planning (3)** Mazzuchi and Staff

- Quantitative methods in model building for logistics systems, including organization, procurement, transportation, inventory, maintenance, and their interrelationships. Stresses applications. Prerequisite: ApSc 115, Math 32. (Spring, odd years)
- 238 **International Disaster Management (3)** Friedrich and Staff
Guiding principles, key institutions, operational requirements, policy issues, and broad fundamentals associated with international disaster risk reduction and humanitarian response to natural and man-made disasters and complex emergencies. (Fall)
- 239 **Medical and Public Health Emergency Management (3)** Barbera and Staff
Medical and public health management issues encountered in crises, emergencies, and disasters are examined and presented at the technical level of a non-medical emergency manager. The spectrum of medical, public health, psychological and behavioral problems are described, as well as incident management organization and processes that addresses these concerns and integrate medical and public health assets into the response. (Spring)
- 240 **Management of Terrorism Preparedness and Response (3)** Barbera and Staff
Terrorism, terrorist methods, and human/infrastructure vulnerability. Current preparedness and response programs. Mitigation, preparedness, and response requirements to manage mass terrorism incidents within the context of all-hazard emergency management. Case studies. (Fall)
- 241 **Introduction to Management of Construction (3)** Murphree and Staff
How the construction industry worldwide works: feasibility studies; organization for construction; financing and cost accounting for construction; design and engineering

contracts and procedures; construction contracts; change orders and delays; acceleration; claims, arbitration, mediation, litigation; labor management; project planning. (Fall, even years)

242 **Construction Project Management (3)** Murphree and Staff

Applications of CPM concepts; owner and contractor viewpoints and needs; subcontractor relations and control; use of computer software to follow an example construction job from concept through design and contract award, and construction; attention to change orders, weather-caused and other delays; acceleration; claims; job closeout. (Spring, odd years)

243 **Construction Cost Management (3)** Murphree and Staff

Cost estimating and control for owner and contractor from project concept through construction, operation and maintenance, to disposal. Parametric cost estimating; budget estimates during design; detailed quantity takeoff and pricing from completed designs; bid preparation; financing alternatives; cost control during construction; computers in cost control. (Spring)

245 **Facilities Operation and Maintenance Management (3)** Murphree and Staff

Economic issues in facilities management; planning and organization for maintenance; energy and environmental issues; strategies; day-to-day operation and maintenance; estimating with standard production models; computers in maintenance operations; contracts for maintenance: preparation and administration; facility obsolescence, recycling and disposal. (Spring)

246 **Reliability Analysis and Infrastructure Systems (3)** Sarkani and Staff

Modeling basic variables and defining the limit-state surface. Computing the reliability index of an infrastructure system by approximating the limit-state surface—FORM and SORM. Modeling an infrastructure system. Reliability analysis using branch and bound, failure paths and failure modes, identification of dominant failure paths. Case studies. (Fall)

248 **Geographic Information Systems for** Fiedrich and Staff

Emergency Management (3)

Key concepts of geographic information systems; GIS-based analysis for emergency management; domain-specific GIS applications; hands-on GIS software training; case studies on different aspects of emergency and disaster management. Prerequisite: EMSE 233 or permission of instructor. (Fall)

249 **Geospatial Techniques (3)** Staff

Same as Geog 221.

250 **Information and Software Engineering (3)** Bada and Staff

Introduction to analysis and design of information systems including requirements analysis, project management, and software architectures. Introduction to CASE tools. Prerequisite: EMSE 256 or permission of instructor. (Fall, even years)

251 **Linear Programming (3)** Abeledo and Staff

The simplex method and its variants, considered from theoretical and computational points of view. Duality and sensitivity analysis. Decomposition methods for large-scale problems. Network flow problems. Prerequisite: EMSE 209 or permission of instructor. (Fall)

252 **Nonlinear Programming (3)** Abeledo and Staff

Basic theoretical and computational topics in optimization theory, including convexity and the optimality conditions. Algorithms for solving unconstrained, linearly constrained, and nonlinearly constrained problems. Applications.

Prerequisite: EMSE 209 or permission of instructor. (Spring)

253 Integer and Network Programming (3) Abeledo and Staff

Combinatorial optimization problems: algorithms and applications. Network problems: minimum spanning tree, shortest path, maximum flows, minimum cost flows, optimal matchings, routing problems. Complexity theory. Enumeration and cutting plane methods for solving integer programs. Prerequisite: EMSE 251 or permission of instructor. (Spring, odd years)

254 Applied Optimization Modeling (3) Abeledo and Staff

Analysis of linear, integer, and nonlinear optimization models of decision problems that arise in industry, business, and government. Modeling techniques and applications; use of optimization software to solve models. Prerequisite: EMSE 201 or permission of instructor. (Fall)

255 Management of Research and Development (3) Murphree and Staff

The integration of technological and business issues considered as a vital part of the organizational adaptation process. Assessment of tools to evaluate the impact of research and development decisions on organizational effectiveness.

(Fall and spring)

256 Information Management and Information Systems (3) Bada and Staff

The use of information in organizations, the management of the information resource; the impact of information and communication technology. (Spring)

- 257 **Production Design (3)** Duffey and Staff
- Consideration of production design and operations in the context of an integrated company strategy. Process and trade-off analyses, capacity management and planning, technology planning. (As required)
- 260 **Survey of Finance and Engineering Economics (3)** Duffey and Staff
- Survey of material relevant to financial decision making for engineering activity. Includes traditional engineering economy topics; fundamentals of accounting; and financial planning, budgeting, and estimating applicable to the management of technical organizations. (Fall, spring, and summer)
- 261 **Economic Analysis in Engineering Planning (3)** Duffey and Staff
- Case studies in engineering economic analysis, capital budgeting, benefit–cost analysis, and other cost-related methodologies relevant to engineering managers. Prerequisite: EMSE 260 or permission of instructor. (Fall)
- 262 **Finance for Engineers (3)** Duffey and Staff
- Financial analysis and concepts useful to engineers: sources and uses of funds, management of working capital, leverage, valuation, forecasting, investment decisions. Prerequisite: EMSE 260. (Fall)
- 267 **Theory of Games (3)** Campos-Nanez and Staff
- Mathematical models of conflict and cooperation with applications in economics, business, defense, transportation, and societal issues (voting schemes, fair division, auctions). Concept and computation of equilibrium in n-person games. Prerequisite: Math 33 or permission of instructor. (Fall)
- 268 **Decision Analysis (3)** Soland and Staff

- Decision making under certainty, uncertainty, and one and several criteria. Decision analysis and decision trees, value of information, subjective probability and Bayesian statistics, utility and value theories, multiple-criteria decision making and optimization, goal programming. Prerequisite: ApSc 116 and EMSE 201; or permission of instructor. (Fall, even years)
- 269 **Elements of Problem Solving and Decision Making for Managers (3)** Mazzuchi and Staff
- Problem formulation. Concepts and techniques used in analyzing complex decision problems. Modeling decision problems using decision trees, probability models, multi-objective models and utility theory. (Fall, spring, and summer)
- 270 **Knowledge Management I (3)** Stankosky and Staff
- The foundations of knowledge management, including cultural issues, technology applications, organizational concepts and processes, management aspects, and decision support systems. Case studies. (Fall)
- 271 **Data Analysis for Engineers and Scientists (3)** Mazzuchi, van Dorp, and Staff
- Design of experiments and data collection. Regression, correlation, and prediction. Multivariate analysis, data pooling, data compression. Model validation. Prerequisite: ApSc 115. (Fall and spring)
- 273 **Discrete Systems Simulation (3)** van Dorp and Staff
- Simulation of discrete stochastic models. Simulation languages. Random-number/random-variate generation. Statistical design and analysis of experiments, terminating/nonterminating simulations; comparison of system designs. Input

- distributions, variance reduction, validation of models. Prerequisite: ApSc 115; CSci 49, 50, or 53; or permission of instructor. Same as Stat 173. (Spring)
- 277 **Queuing Theory (3)** Mazzuchi and Staff
- Single-channel exponential queuing systems, Markovian single- and multiple-channel models, including birth–death processes, finite sources, Erlangian models. General arrival and service patterns. Jackson networks. Model building, basic solution techniques, and formal theoretical developments. Prerequisite: EMSE 208 or permission of instructor. (Spring, even years)
- 279 **Inventory Control (3)** Mazzuchi and Staff
- Mathematical techniques applied to decisions about when and how much to produce or purchase. Mathematical models of inventory systems with deterministic and stochastic demands, continuous and periodic review policies, multi-item models with constraints, multi-echelon models. Prerequisite: ApSc 116 or permission of instructor. (Fall, odd years)
- 280 **Techniques of Risk Analysis and Management (3)** Mazzuchi, Sarkani
- Topics and models in current risk analysis; modern applications of risk-based planning and risk management; use of quantitative methods in risk analysis. (Spring)
- 281 **Reliability Theory (3)** Mazzuchi and Staff
- Mathematical theory: coherent structures, association of random variables, stochastic characterization of wear, preservation theorems, bounds and inequalities. Statistical theory: probabilistic derivation of failure models; Bayesian methods. Life testing,

- survival analysis, expert opinion. Prerequisite: EMSE 208 or permission of instructor. (Fall)
- 282 **Quality Control and Acceptance Sampling (3)** Mazzuchi and Staff
- Statistical approaches to quality assurance. Single and multivariate control charts, acceptance sampling by attributes and variables, process capability and design of experiments. Prerequisite: ApSc 115 or permission of instructor. (Spring)
- 283 **Systems Engineering I (3)** Eisner and Staff
- Systems approach to the architecting and engineering of large-scale systems; elements of systems engineering; methods and standards; computer tools that support systems and software engineering; trends and directions; the integrative nature of systems engineering. (Fall, spring, and summer)
- 284 **Systems Engineering II (3)** Eisner and Staff
- Application of systems engineering tools to provide hands-on experience with essential elements of practice. Processes of requirements engineering, functional analysis and allocation, risk management, architecting; architectural heuristics, axiomatic design, analytical assessment of alternative architectures. Prerequisite: EMSE 283. (Spring)
- 285 **Systems Analysis and Management (3)** Eisner and Staff
- The systems or holistic approach as a methodology for making decisions and allocating resources. Analysis by means of objectives, alternatives, models, criteria, and feedback. Prerequisite: EMSE 269 or equivalent. (Fall)
- 286 **Applied Enterprise Systems Engineering (3)** Sarkani and Staff

- Applications of systems engineering in the DoD, other parts of the federal government, and commercial sectors. Architectural frameworks and enterprise architecting concepts and practices, including JCIDS/DODAF, Federal Enterprise Architecture Framework, and Zachman™ Framework. Enterprise architecting and advanced modeling tools. Prerequisite: EMSE 284. (Spring)
- 287 **Decision Support Systems and Models (3)** Stankosky and Staff
Theory of decision making—a cognitive view. Modeling decision maker heuristics and processes. Design, implementation, and evaluation of state-of-the-art DSS (hands-on). Assess impact of behavioral, situational, and organizational variables. (Fall)
- 288 **Technology Issue Analysis (3)** Eisner and Staff
Contextual background and intellectual basis for addressing technology issues in the public and private sectors. Technology impact assessment, forecasting, and innovation; principles and practices of technology transfer as elements of a systematic approach to making technology decisions. (Fall, odd years)
- 289 **Seminar: Evolution of Technology and Organizations (3)** Murphree and Staff
Exploration of the evolution of, and connections between, technology and human knowledge, particularly with respect to economic development. Assessment of the role of management in the process of societal change. (Spring, odd years)
- 290 **Human Factors Engineering (3)** Ryan and Staff
Study of the human–machine interface applied to system design, job design, and technology management. Human sensory–motor, perceptual, and cognitive functions; task analysis and allocation; contextual aspects of human factors engineering.

- Modeling, design, and evaluation methodologies. Applications to user-centered industrial and information systems. (As required)
- 291 **Problems in Operations Research (3)** Soland and Staff
- Field experience in operations research on a team basis. Each small group confronts an actual problem and formulates a solution using operations research models. Oral and written reports. Open only to master's candidates in the department during the last year of their program. (Spring)
- 292 **Special Topics (3)** Mazzuchi and Staff
- Selected topics in engineering management and systems engineering, as arranged. May be repeated for credit. Prerequisite: permission of instructor. (Fall and spring)
- 293 **Technical Enterprises (3)** Murphree and Staff
- Essential features of technology-based companies from the entrepreneur's point of view. Team preparation of a simulated business plan for a technology-based company. Designed for those working in technical firms and for government personnel who depend on technical firms as suppliers. (Spring, odd years)
- 294 **Marketing of Technology I (3)** Stankosky and Staff
- Analysis of industrial marketing process and functions, providing concepts and tools for engineering managers to market high technology products and services. (Fall, odd years)
- 295 **Database Design and Database Management Systems (3)** Bada and Staff
- Concepts, strategies, and features of database design and management. Analysis, design, and implementation of database systems for micro and mainframe applications. Development of a microcomputer database system. (Spring)

- 296 **Software Project Development with CASE (3)** Bada and Staff
- Evaluation and selection of CASE tools, use of CASE tools in software design/project. Graphical user interface and re-engineering tools. Open only to master's candidates in the department during the last semester of their program.
- Prerequisite: EMSE 250. (Spring, even years)
- 297 **Problems in Engineering Management and Systems Engineering (3)** Sarkani and Staff
- Capstone project providing the opportunity to apply concepts and tools previously studied to the solution of a real-world problem. Students work in small groups, on a problem proposed by students and approved by the instructor. Open only to master's candidates in the department, preferably during the last year of their program.
- (Fall and spring)
- 298 **Research (arr.)** Staff
- Basic or applied research in engineering management or systems engineering. Open to master's degree candidates in the department. May be repeated for credit.
- (Fall, spring, and summer)
- 299–300 **Thesis Research (3–3)** Staff
- 311 **Marketing of Technology II (3)** Stankosky and Staff
- A systematic treatment of global marketing in the context of U.S. industrial competitiveness. Emphasis on understanding the global technical and marketing environment and formulating marketing strategies. Prerequisite: EMSE 294. (Spring, odd years)
- 312 **Managing the Protection of** Ryan and Staff

Information Assets and Systems (3)

Advanced topics in protection of information assets and systems, including authentication, asset control, security models and kernels, physical security, personnel security, operational security, administrative security, security configuration management, and resource control. Prerequisite: EMSE 218. (Spring)

314 **Auditing, Monitoring, and Intrusion Detection** Ryan and Staff

for Information Security Managers (3)

Methods for detecting problems with unauthorized activity in information systems and management challenges associated with those activities. Prerequisite: EMSE 218. (Spring)

319 **Business and Competitive Intelligence (3)** Ryan and Staff

Discovery and analysis of competitive information from open-source intelligence. Sources and methods for data collection; legal issues and constraints; analysis processes; longitudinal aspects; inference. (Spring)

320 **Managing E-Commerce Technologies (3)** Bada and Staff

Principles of good e-business management. Methods of conducting e-commerce—major opportunities, limitations, issues, and risks. Popular technologies for building e-businesses, security authentication, privacy, acceptable use policies, and legal limits. (Fall, odd years)

321 **Data Communications and Networks (3)** Murphree and Staff

Technical and managerial aspects of data communications, with emphasis on communication networks. Methodologies used in data communications, communication networks, and distributed data processing. (On demand)

322 **A Strategic Approach to Information Systems (3)** Bada and Staff

Policies and guidelines that govern the arrangement of IT tools and data. Issues related to the establishment of a logical, coherent plan for decisions about technology investments and the support of tight coordination through a focus on system compatibility, interconnection, and integration. Prerequisite: EMSE 256 and 295.
(On demand)

332 **Disaster Recovery and Organizational Continuity (3)** Shaw and Staff

Disaster recovery planning and business continuity. Recovery of information and communication systems. The role of the private sector in mitigation and recovery. Public/private partnerships in community reconstruction and recovery. (Spring)

333 **Hazard Mitigation in Disaster Management (3)** Shaw and Staff

Hazard mitigation and its role in disaster management; analysis of past and current government and private-sector programs; examination of new approaches; structural versus nonstructural actions; mitigation of terrorist attacks. (Fall)

334 **Environmental Hazard Management (3)** Deason and Staff

Geological, meteorological, radiological, chemical, and biological hazards facing the United States and international communities. Organizational responsibilities for hazard identification and risk management. Communication and perceptions of vulnerability and risk. Challenges to local governments and communities. (Spring)

344 **Construction Management Seminar (3)** Murphree and Staff

Timely issues, recent research findings; guest speakers from the construction industry; in a seminar setting, students present results from individual research

- projects; applications of high technology in construction management; special emphasis given to productivity in construction. (Spring, even years)
- 351 **Advanced Topics in Mathematical Programming** (3) Abeledo and Staff
- Fractional and geometric programming, branch-and-bound methods, max–min problems, Lagrangian algorithms, nonconvex optimization techniques. Prerequisite: EMSE 252 or permission of instructor. (Spring, odd years)
- 353 **Advanced Topics in Combinatorial Optimization** (3) Abeledo and Staff
- Polyhedral theory. Integral polytopes. Use of polyhedral structure in the solution of integer programming problems. Strong valid inequalities for classes of integer programs. Lagrangian relaxation and decomposition methods. Prerequisite: EMSE 253 or permission of instructor. (Spring, even years)
- 370 **Knowledge Management II** (3) Stankosky and Staff
- A capstone course. Students work in teams, applying principles and processes of systems thinking, systems engineering, and integrative management in the design and implementation of a knowledge management system. Prerequisite: EMSE 270. (Spring)
- 373 **Design and Analysis of Simulation Experiments** (3) Frieder, van Dorp, and Staff
- Special topics from among perturbation and sensitivity analysis, initial transient problems and warm-up periods for nonterminating simulations, variance reduction techniques, response surface methods, developments in simulation software. Prerequisite: EMSE 273 or permission of instructor. (Fall, odd years)
- 377 **Advanced Stochastic Models in Operations Research** (3) Mazzuchi and Staff

Applied probability models, including the Poisson process, continuous-time, denumerable-state Markov processes, renewal theory, semi-Markov regenerative processes. Applications to queues, inventories, and other operations research systems.

Prerequisite: EMSE 277 or permission of instructor. (Fall, even years)

386 **Advanced Topics in Management (3)** Murphree and Staff

Readings and discussion of classical and recent literature concerning the philosophy and practice of management in technical organizations, including the impacts of changing technology, globalization, and insights from the social sciences.

(Fall, odd years)

387 **Technological Forecasting and Management (3)** Stankosky and Staff

Concepts and methods for understanding the dynamics of technological change.

Issues in technology assessment, technology transfer, and strategic management of technology. (Spring, even years)

388 **Quantitative Methods in Cost Engineering (3)** van Dorp and Staff

Fitting exponential growth curves using cost data for forecasting; multiperiod capital budgeting using the analytical hierarchy process and optimization; and project network risk analysis. Case studies highlight theoretical complexities in solving problems. (Spring, odd years)

390 **Applied Data Mining in Engineering Management (3)** Friedrich, Mazzuchi, and Staff

Methods and techniques for discovering patterns and relationships in aggregated data, with practical focus on engineering problems. Tools, techniques, and methods explored in the context of their application. Prerequisite: EMSE 269, 295.

(As needed)

- 391 **Project for Professional Degree (3)** Soland and Staff

Limited to students in the Applied Scientist or Engineer degree program. (Spring)

- 397 **Advanced Topics in Operations Research (3)** Mazzuchi and Staff

Advanced topics from the literature of operations research for analysis, presentation, and discussion. Reading assignments from professional journals selected by the instructor and the student. May be repeated for credit. Prerequisite: permission of instructor. (As arranged)

- 398 **Advanced Reading and Research (arr.)** Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit.

- 399 **Dissertation Research (arr.)** Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit.

ENGLISH

Professors R.N. Ganz, Jr., J.A.A. Plotz, C.W. Sten, D. McAleavey, O.A. Seavey, A. Romines, J.A. Miller, M. Alcorn, J.J. Cohen (*Chair*), J.G. Harris, K. Moreland, S. Knapp, R.L. Combs, G. Wald

Associate Professors G. Carter, M.S. Soltan, D. Moshenberg, T.G. Wallace, J.M. Green-Lewis, P. Cook, P. Chu, M. Frawley, R. McRuer, J.C. James, K. Daiya

Assistant Professors H. Dugan, A. Lopez, J. Hsy, H.G. Carrillo, K. Lawrence

Master of Arts in the field of English with optional concentrations in English or American literature—Prerequisite: a Bachelor of Arts degree with an undergraduate major in English or American literature, or 24 credit hours in English or American literature above the sophomore level.

Required: the general requirements stated under Columbian College of Arts and Sciences, including (1) 24 credit hours of course work planned in consultation with the department advisor; (2) a Master's Comprehensive Examination in American or English literature, to be passed at the end of the course work; and (3) a master's thesis (6 credit hours) on an approved topic, directed by a member of the department's graduate faculty, or 6 additional credits of course work.

Students must maintain a grade-point average of at least 3.25.

Doctor of Philosophy in the field of English with optional concentrations in English or American literature—Prerequisite: a Bachelor of Arts degree with an undergraduate major in English or American literature, or 24 credit hours in English or American literature above the sophomore level.

Required: the general requirements stated under Columbian College of Arts and Sciences, including satisfactory completion of (1) course work planned in consultation with the department advisor; (2) a comprehension exam in a language approved by the department; (3) a qualifying examination in American literature or English literature, to be passed midway through the student's course work, and a field examination, to be passed by the end of the student's course work, topics and reading lists for which are designed in consultation with two graduate faculty advisors; (4) a dissertation proposal one semester after the field exam; and (5) a dissertation on an approved topic, directed by a member of the department's graduate faculty and completed by the end of the fifth year of study. Each student plans a program of studies in consultation with the department advisor and a committee of the graduate faculty. Students must maintain a grade-point average of at least 3.5.

Note: All graduate English courses, except Engl 203, may be repeated for credit with permission of the director of graduate studies.

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| 203 | Introduction to Literary Theory (3) | McRuer, Alcorn, Harris, Lopez |
| | An overview of methodologies for examining texts as linguistic and cultural productions. Methodologies explored may include structuralism, formalism, deconstruction, cultural materialism, postcolonial theory, feminism, gender studies, and queer theory. | |
| 205 | Advanced Literary Theory (3) | McRuer, Alcorn, Harris, Lopez |
| | The course focuses on a major figure or topic in theory (e.g., Foucault, Lacan, Barthes, Kristeva, Bakhtin, post-Marxist theory, language and power, the canon). | |
| 206 | Topics in Medieval and Early Modern Studies (3) | Cohen, Harris, Dugan, Hsy |
| | Topics may include gender and body; postcolonial approaches to the period; surveys of poetry and/or prose with a special thematic coherence. (Fall) | |
| 207 | Literature of the British Archipelago (3) | Cohen, Harris, Dugan, Hsy |
| | The literary and historical texts of early modern and medieval Britain within a pan-insular framework: England in conflict and coexistence with Ireland, Wales, Scotland. (Fall) | |
| 208 | Transnational England (3) | Cohen, Harris, Dugan, Hsy |
| | The early literature of England within a global framework: England, Spain, France, Italy, Turkey, the Levant, the Americas, Africa, India, the Caribbean. (Spring). | |
| 209 | Seminar in Medieval and Early Modern Studies (3) | Cohen, Harris, Dugan, Hsy |
| | Trends and cutting-edge research in medieval and early modern studies. (Spring) | |

- 231–34 **Nineteenth Century (3–3–3–3)** Green-Lewis, Moreland, Plotz, Romines,
Seavey, Sten, Wallace, James, Frawley
Topics in British and American nineteenth-century writing and culture, exploring
national traditions and international movements and issues, such as Romanticism,
Realism, and others.
- 235–38 **Twentieth Century (3–3–3–3)** Chu, Green-Lewis, Miller, Moreland,
Romines, Wald, James, Lopez, Soltan
Topics in twentieth-century British and American writing and culture, exploring
national traditions and international movements and issues, such as literary
modernism, anti-modernist and post-modernist currents, others.
- 240 **Writing Race and Nation (3)** Chu, Miller, Wald, Cohen, James,
Dugan, Lopez, Hsy, Harris, Wallace
Literary culture as a basis for exploration of intersections of origins and evolution of
racial and ethnic identities and national myths and political objectives.
- 241 **Conceptualizing Genders (3)** Cohen, McRuer, Wald, Wallace, Dugan
Structures of sex and gender difference considered historically and theoretically,
including masculinity/femininity, sexualities, and their textual representations.
- 242–43 **Studies in Genre (3–3)** Sten, Daiya, Wallace
Questions of genre, considered theoretically and practically. Content varies.
- 244 **Ethnicity and the Construction of Identity (3)** Chu, Cohen, Lopez, Harris, Hsy
Literary culture is used to explore how individuals, communities, and societies
construct self-awareness and knowledge about others for cultural exchange.

- 247 **Postcolonialism (3)** Plotz, Daiya, Lopez, Wallace, Chu
Postcolonial theory and texts by representative writers.
- 251 **Women and Writing (3)** Romines, Wald, Wallace
Selected topics in the traditions, theory, and texts of women's literary production and culture. Same as WStu 251.
- 261 **Selected Topics in Criticism (3)** Wald, McRuer, Harris
Topics may include cultural studies, film, gay/lesbian studies, others.
- 295 **Independent Research (3)** Staff
Written permission of instructor required. May be repeated for credit to a maximum of 9 hours.
- 299–300 **Thesis Research (3–3)** Staff
- 301–2 **Folger Institute Seminars (3–3)** Staff
Topics will be announced in the Schedule of Classes. May be repeated for credit provided the topic differs. Consult the graduate advisor before registration.
- 398 **Advanced Reading and Research (arr.)** Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.
- 399 **Dissertation Research (arr.)** Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit.

ENVIRONMENTAL AND RESOURCE POLICY

Director H. Merchant

Master of Arts in the field of public policy with a concentration in environmental and resource policy—The program is affiliated with the School of Public Policy and Public

Administration. Prerequisite: a bachelor's degree with a *B* average (or equivalent) in a social science, natural science, or other relevant area from an accredited college or university and an introductory course in statistics.

Required:

- (a) The general requirements stated under Columbian College of Arts and Sciences.
- (b) Twenty-six hours of core courses selected from the following (students whose backgrounds include some of these courses may substitute additional courses in the elective field): BiSc 208, 243; Econ 217, 237; EnRP 210, 240; PSc 203; PAd 201; Stat 183 (or other appropriate statistical techniques course).
- (c) Twelve credit hours chosen from designated courses within one of four elective fields—earth sciences, ecology, energy, and resource management. Courses are drawn from the Departments of Biological Sciences, Economics, and Geography and from the School of Engineering and Applied Science.
- (d) Comprehensive Project—Undertaken at the completion of the student's program, the comprehensive project is the investigation of a specific problem in environmental and resource policy and the development of a proposed solution in a manner that integrates the core curriculum with the course work in the elective field.

210 Seminar in Environmental and Resource Policy (3)

Merchant

Approaches to environmental decision making as related to the formation of environmental and resource policy. Emphasis on the development of a practical model to be used in the evaluation and incorporation of disparate information relevant to an environmental issue. Limited to degree candidates in the program or enrollment with permission of the instructor.

240 **Environmental Impact Statement**

McGuirl

Procedures and Environmental Law (3)

The rationale for environmental impact statements from the viewpoint of the nature and origins of environmental concerns. Government agencies responsible for environmental impact statements; current statutes and regulations pertaining to the environment.

EPIDEMIOLOGY

Columbian College of Arts and Sciences offers the degrees of Master of Science and Doctor of Philosophy in the field of epidemiology. The School of Public Health and Health Services collaborates with the Department of Statistics and the Biostatistics Center in these degree programs. For the Public Health courses listed below, please contact the School of Public Health and Health Services.

Master of Science in the field of epidemiology—Prerequisite: course work in multivariate calculus and matrix theory (Math 33 and 84) and proficiency in computer applications (Stat 183 or PubH 249). With approval of the academic director, applicants who lack some of the listed prerequisite course work may be admitted to degree candidacy and fulfill deficiencies during the first year of study; such course work does not count toward degree requirements.

Required: The general requirements stated under Columbian College of Arts and Sciences. The program of study consists of 33 hours of course work, including Stat 157–58 and PubH 201, 202, 203, 209, 212, 247, 252, and 258. Elective courses are chosen from either statistics or public health. A two-part Master’s Comprehensive Examination is required.

Doctor of Philosophy in the field of epidemiology—Prerequisite: a master’s degree in epidemiology or a closely related field, including the prerequisites listed under the Master of

Science in the field of epidemiology. In some cases, an exceptionally well-prepared candidate may enter the program with a bachelor's degree.

Required: The general requirements stated under Columbian College of Arts and Sciences. Requirements include the public health courses for the Master of Science in the field of epidemiology plus Stat 201–2, 210; PubH 265, 266, and one course chosen from PubH 207 or another approved public health course. Electives are chosen from statistics and public health. At the end of the second year of study, a two-part General Examination is taken on biostatistics and epidemiology.

295 Reading and Research (arr.)

May be repeated for credit.

299–300 Thesis Research (3–3)

398 Advanced Reading and Research (arr.)

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.

399 Dissertation Research (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit.

FINANCE

Professors T.M. Barnhill, W. Handorf, M.S. Klock (*Chair*), S. Phillips, I.G. Bajeux-Besnainou,
G.M. Jabbour, R.K. Green

Associate Professors N.G. Cohen, P.S. Peyser, A.J. Wilson, R. Savickas, S. Agca, G. Jostova

Assistant Professors A. Baptista, M. Hwang, C.A. Pirinsky, B.J. Henderson

Professorial Lecturers S. Uyanik, J. Overdahl, R. Strand

See the School of Business for programs of study in business administration leading to the degrees of Master of Accountancy, Master of Business Administration, Master of Science in Finance, and Doctor of Philosophy.

221 **Financial Decision Making (3)** Sachlis, Peyser, Wilson

Theory and practice of business finance, emphasizing the impacts of long- and short-term uses and sources of funds on the firm's market value. Prerequisite: MBAd 250. (Fall and spring)

222 **Capital Formation (3)** Handorf and Staff

Determinants of saving and investment and resultant funds flow are evaluated. Special emphasis on the level and risk structure and term structure of interest rates. The role and management of financial institutions is stressed. Prerequisite: MBAd 250. (Fall and spring)

223 **Investment Analysis and Portfolio Management (3)** Cohen, Klock, Bajeux-Besnainou, Baptista

Risk-reward analysis of security investments, including analysis of national economy, industry, company, and market; introduction to portfolio management; emphasis on theory and computer methods. Prerequisite: MBAd 250. (Fall and spring)

224 **Financial Management (3)** Barnhill, Cohen

Advanced case studies in domestic and international financial management; working capital policy, capital budgeting, financing with debt and equity, dividend policy, valuation, project finance, venture capital, and mergers and acquisitions. Prerequisite: Fina 221. (Fall and spring)

- 234 **New Venture Financing:** Carayannis, Barnhill
Due Diligence and Valuation Issues (3)
Fundamentals and practice of due diligence and screening of early-stage investment opportunities. Same as Mgt 296.
- 235 **Futures Markets: Trading and Hedging (3)** Staff
Organization and regulation of futures markets. Alternative strategies for trading of futures contracts for possible hedging uses. High risk–high return investment alternatives. The use of futures markets to manage risks. Prerequisite: MBAd 250; recommended: Fina 221. (Fall and spring)
- 236 **Options (3)** Jabbour and Staff
Pricing of options on financial instruments. Role of options in risk management, trading strategies, hedging implications for national and international investors, financial engineering, and structure and regulation of option markets. Prerequisite: MBAd 250; recommended: Fina 221. (Fall and spring)
- 237 **Personal Financial Advising (3)** Cohen
For students preparing to be personal financial advisors; the combination of taxes, pensions, investing, budgets, estates and trusts, and insurance into comprehensive personal financial plans. Regulation, professional ethics, and the economics of advisory firms. Extensive use of computer spreadsheets and case studies. Prerequisite: Fina 223; Accy 261 is recommended. (Spring)
- 238 **Financial Engineering (3)** Barnhill
Valuation and risk management theory for bonds, forward contracts, swaps, options, exotic options, and interest rate options. Development of financial software, including

- Monte Carlo simulation modeling. Case studies of innovative solutions to investment, corporate finance, and financial institution management problems. Prerequisite: Fina 236. (Spring)
- 240 **Real Estate Development (3)** Staff
Examination of the forces that shape real estate development; market analysis methods and techniques to evaluate project feasibility; the institutional and legal framework within which real estate development occurs and that influences controls, land value, and development potential. (Fall)
- 241 **Financing Real Estate Development (3)** Green, Hwang
Principles of real estate development finance; evaluating and measuring the investment attractiveness of real estate projects; obtaining, differentiating, and hedging sources of real estate funding; and appraising property. Incentives provided by local, state, and federal governments. Prerequisite: MBAd 250 or permission of instructor. (Fall and spring)
- 242 **Problems in Real Estate Valuation (3)** Staff
Applications of market analysis, valuation, and financial techniques to the real estate development process.
- 248 **Real Estate Development Cases (3)** Staff
Case study analysis of large-scale commercial real estate developments to gain comprehension of financial, political, legal, and technical complexities and constraints inherent in the real estate development process. Prerequisite: Fina 220 or permission of instructor.

Master of Science in Finance degree candidacy is prerequisite to Fina 271 to 282.

- 271 **Financial Modeling and Econometrics (4)** Soyer, Wirtz
Applied statistical and econometric analysis and modeling in finance. Methodologies include descriptive and inferential statistics, multivariate regression, time series analysis, and simulation modeling. Empirical studies are reviewed, and a series of research projects are undertaken. (Fall)
- 272 **Global Financial Markets (4)** Yang, Rehman
Theories explaining domestic and international interest rate and exchange rate structures. Roles of financial institutions and markets are investigated and forecasting methodologies are applied. (Spring)
- 273 **Advanced Accounting Applications for Finance (4)** Kumar, Neuhauser
Intermediate financial accounting; international and tax accounting. Emphasis on computer modeling to analyze and forecast a firm's financial statements to reflect possible future performance. (Fall)
- 274 **Corporate Financial Management and Modeling (4)** Sachlis, Handorf
The foundation theories of business real investment and financing are summarized and applied in a simulation environment. Emphasis on understanding the causal connections between business decision making in a global economy and the resulting valuation of the firm's financial assets. Financial modeling and forecasting applications. (Fall)
- 275 **Investment Analysis and Global Portfolio Management (4)** Jostova, Savickas
Financial markets and instruments viewed from the investor's perspective. Analysis of the value of equity and fixed-income securities and the construction of efficient

portfolios in a global financial market. Issues of market efficiency, tax structures, and investment funds; computer-based models. (Spring)

276 **Financial Engineering and Derivative Securities (4)** Jabbour, Seale

Mathematical and theoretical foundations to value-derivative securities, including options, futures, and swaps; hedging and trading applications of these contracts. Arbitrage trading across cash and derivative markets and its role in maintaining equilibrium prices. (Summer)

277 **Comparative Financial Market Regulation and Development (4)** Staff

Theory and current status of comparative regulation of domestic and international financial institutions and markets. Effects on country economic development and international trade. (Fall)

278 **Financial Theory and Research (4)** Peyser, Bajoux-Besnainou

Theoretical constructs of business investment and financing decisions and of financial asset pricing structures in domestic and international environments. Analytical and numerical models are developed, and empirical studies are evaluated. (Spring)

279 **Real Estate Finance and Fixed-Income Security Valuation (4)** Green, Agca

A primary focus is the application of financial theory to real estate investment and financing. Another is fixed-income security valuation and design and portfolio management. Application of decision support and artificial intelligence systems in making financial decisions. (Spring)

280 **Financial Institution Management and Modeling (4)** Handorf

Financial institution asset and liability management. A dynamic simulation model is developed and run under varying macroeconomic conditions, as additional layers of complexity, involving multinational investment, borrowing, and hedging, are added. (Summer)

281 **Cases in Financial Management and Investment Banking (4)** Cohen, Jabbour

Through a series of cases and simulations, students address real financial problems faced by domestic and international companies, including capital budgeting, capital structure, mergers and acquisitions, and project financing. The negotiating process by which many financial situations are resolved is emphasized. (Summer)

282 **Directed Research in Finance (1 to 4)** Jabbour, Joutz, Click

Students design and execute a financial research study, applying knowledge developed throughout the M.S.F. program. Class sessions vary from lectures on research methods to colloquia by outside professionals to critique studies. (Summer)

290 **Special Topics (3)** Staff

Experimental offering; new course topics and teaching methods. May be repeated once for credit.

297 **International Management Experience (3)** Staff

Same as Accy/IBus/Mgt/Mktg/SMPP 297. May be repeated for credit.

298 **Directed Readings and Research (2 to 4)** Staff

299 **Thesis Seminar (3)** Staff

300 **Thesis Research (3)** Staff

311 **Seminar: Public–Private Sector Institutions and Relationships (3)** Staff

Same as SMPP 311.

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| 321 | Seminar: Financial Markets Research (3) | Klock |
| | Market efficiency, utility testing, the capital asset pricing model, the arbitrage pricing theory, the option pricing model, and aggregate market volatility. | |
| 322 | Seminar: Corporate Finance Research (3) | Neuhauser |
| | Capital budgeting, capital structure issues, dividend policy, microeconomic foundations, mergers, and agency theory. | |
| 323 | Seminar: Continuous-Time Finance (3) | Bajeux-Besnainou, Savickas |
| | Review of the stochastic calculus methods needed for continuous-time pricing models. The most important continuous-time models, including pricing of derivative securities, consumption-portfolio selection models, continuous-time capital asset pricing models, consumption-based capital asset pricing models, continuous-time arbitrage pricing theory, and different yield curve models. | |
| 324 | Seminar: Financial Markets and Institutions (3) | Staff |
| | Multi-period asset pricing, term structure of interest rates, market imperfections and institutional factors, auctions, manipulation, derivative markets, market microstructure, and financial institutions. | |
| 397 | Doctoral Seminar (1 to 3) | Staff |
| 398 | Advanced Reading and Research (arr.) | Staff |
| | Limited to doctoral candidates preparing for the general examination. May be repeated for credit. | |
| 399 | Dissertation Research (arr.) | Staff |
| | Limited to doctoral candidates. May be repeated for credit. | |

FINE ARTS AND ART HISTORY

Professors L.F. Robinson, J.F. Wright, Jr., T. Ozdogan, J.C. Anderson, B. von Barghahn, D.

Bjelajac

Associate Professors J.L. Stephanic, P. Jacks, T. Brown (*Chair*), D. Kessmann

Assistant Professors A.B. Dumbadze, S.A. Rigg, B.K. Obler

Master of Arts in the field of art history—Prerequisite: a bachelor's degree in an appropriate field, such as art history, history, literature, or religion.

Required: the general requirements stated under Columbian College of Arts and Sciences; 36 credit hours of course work at the 200 level. During the first year of study (18 credits), students are encouraged to take up to 9 credits in proseminar courses and are required to complete the art historiography seminar (AH 258) during the first semester. As many as 6 credits of graduate course work may be completed outside the department with approval of the graduate advisor. Students must submit two qualifying papers, the first after the completion of 9 credits and the second after 27. A reading knowledge examination in French, German, Italian, or Spanish must be passed upon completion of the first 9 credits of course work.

Master of Arts in the field of art history with a concentration in museum training—Prerequisites and requirements are the same as those for the Master of Arts in the field of art history; students include in their course work 6 credits of AH 299, Museum Internship, after completion of 18 credits of art history courses.

Master of Fine Arts in the fields of ceramics/sculpture, drawing/painting, new media, or photography—Prerequisite: a bachelor's degree with a major in the field of ceramics, design, digital arts, drawing, film, new media, painting, photography, sculpture, or video. Departmental approval of the applicant's portfolio is required.

Required: the general requirements stated under Columbian College of Arts and Sciences. A minimum of 60 credit hours of course work is required; the number of required credits and their distribution are determined in consultation with advisors. A creative thesis consisting of the execution and exhibition of original works of art, along with a critical statement about this work, must be completed under the supervision of a thesis committee consisting of two or three full-time departmental faculty members.

ART HISTORY

201 Proseminar in Ancient Art of the Bronze Age and Greece (3) Staff

Greek art from the Minoans and Mycenaeans (c. 2000 B.C.) to the age of Alexander (c. 300 B.C.). Relationships among the arts of the different groups in the Aegean area and their impact on Western culture. The Theran volcanic eruption, the “Dorian Invasion,” the portrayal of women, “heroic nudity,” and the assumption of a stylistic chronology.

202 Proseminar in Ancient Art of the Roman Empire (3) Staff

Roman art from the successors of Alexander the Great (c. 300 B.C.) to the fall of the Roman Empire in the West (c. 300 A.D.). The impact of the Greek world on Roman art and culture; innovations and achievements of the Romans in architecture, portraiture, and historical narrative. Focus on the city of Rome and other areas of the Roman world such as North Africa and Asia.

205 Seminar in Ancient Art (3) Staff

Topic announced in the Schedule of Classes. May be repeated for credit provided the topic differs.

211 Proseminar in Early Christian and Anderson

Byzantine Art and Architecture (3)

Art of the Mediterranean world following the collapse of Roman administration.

Growth of the basilica and its decoration; the significance of small objects in medieval study. The rise and fall of the East Roman (Byzantine) Empire from Justinian to 1453.

212 Proseminar in Romanesque and Gothic Art and Architecture (3) Anderson

The origin of Western art from the Hiberno-Saxon and Carolingian worlds and their relationship to the Ancient heritage. Romanesque and Gothic architecture and its sculptural decoration as social phenomena.

215 Seminar in Medieval Art (3) Anderson

Topic announced in the Schedule of Classes. May be repeated for credit provided the topic differs.

220 Proseminar in Italian Art and Architecture of the 13th through 15th Centuries (3) Jacks

Origins, development, and theoretical foundations of Renaissance painting, sculpture, and architecture (Giotto, Duccio, Masaccio, Donatello, Ghiberti, Brunelleschi, Mantegna, Bellini, Botticelli).

221 Proseminar in Italian Art and Architecture of the 16th Century (3) Jacks

The development of the universal genius within the circle of Florence and Rome (Leonardo, Raphael, Michelangelo) and their counterparts in Venice (Giorgione, Titian, Tintoretto, Sansovino, Palladio).

222 Proseminar in Early Northern Renaissance Art and Architecture (3) von Barghahn

- Royal and ducal patronage and the Flemish and French masters of the 15th century, including van Eyck, Campin, van der Weyden, Fouquet, van der Goes, Memling, and Gerard David. Topic announced in the Schedule of Classes. May be repeated for credit provided the topic differs.
- 223 **Proseminar in Northern Renaissance Art and Architecture (3)** von Barghahn
Francis I and Fontainebleau Palace, Henry VIII and Hampton Court, Johann Friedrich of Saxony, and the Holy Roman Emperors Maximilian I and Charles V. François Clouet, Hans Holbein, Lucas Cranach, Albrecht Dürer, Pieter Brueghel, Bernard van Orley, and others.
- 225 **Seminar in Renaissance Art (3)** Jacks, von Barghahn
Topic announced in the Schedule of Classes. May be repeated for credit provided the topic differs.
- 231 **Proseminar in Italian Art and Architecture of the 17th Century (3)** Jacks
The Counter-Reformation and creation of the Baroque in painting, sculpture, and architecture in Rome (Carracci, Caravaggio, Bernini, Borromini, Pietro da Cortona), Turin (Guarini, Juvarra), and Venice (Longhena).
- 232 **Proseminar in Northern European Art and Architecture of the 17th Century (3)** Staff
Hapsburg Flanders and Brussels under the Spanish archdukes and their patronage of Rubens and his circle. The role of Dutch merchants commissioning diverse secular themes in Utrecht, Haarlem, Delft, Leyden, and Amsterdam from “Golden Age” artists such as Rembrandt, Vermeer, and Hals. Specific topic announced in the Schedule of Classes.

- 234 **Proseminar in Spanish and Portuguese Art** Staff
through the 16th Century (3)
The Kingdoms of the Iberian Peninsula from the Reconquest of Granada to the Renaissance Age of Exploration. Specific topic announced in the Schedule of Classes.
- 235 **Seminar in Baroque Art (3)** Jacks, von Barghahn
Topic announced in the Schedule of Classes. May be repeated for credit provided the topic differs.
- 240 **Proseminar in European Art of the 18th Century (3)** Bjelajac
Painting, sculpture, and architecture in France, Great Britain, and Italy. Emphasis on Watteau, Chardin, David, Hogarth, Gainsborough, Reynolds, Canaletto, and Tiepolo.
- 245 **Seminar in European Art of the 19th Century (3)** Robinson
Topic announced in the Schedule of Classes. May be repeated for credit provided the topic differs.
- 246 **Proseminar in Modern Architecture in Europe and America (3)** Jacks
Major developments in architecture and urbanism from the Industrial Revolution to the end of the 20th century.
- 250 **Seminar in Modern Art (3)** Obler, Dumbadze
Topic announced in the Schedule of Classes. May be repeated for credit provided the topic differs.
- 251 **Proseminar in American Art in the Age of Revolution (3)** Bjelajac
American art during the 18th-century “consumer revolution,” the American War for Independence, and the early republic. Emphasis on the socioeconomic and political

purposes of art, with focus on Enlightenment symbolism and the visualization of national identity.

252 **Proseminar in American Art in the Era of National Expansion (3)** Bjelajac

American art from the opening of the Erie Canal in 1825 to the Spanish-American War in 1898. Emphasis on the role of art in the expansion of the United States, exploring issues of race, class, and gender; art and religion.

254 **Seminar in American Art of the 19th Century (3)** Bjelajac

Topic announced in the Schedule of Classes. May be repeated for credit provided the topic differs.

255 **Seminar: Studies in American Art and History (3)**

Same as AmSt 284.

256 **Seminar in American Art of the 20th Century (3)** Dumbadze

Topic announced in the Schedule of Classes. May be repeated for credit provided the topic differs.

257 **Seminar in Photography (3)** Staff

Topic announced in the Schedule of Classes. May be repeated for credit provided the topic differs.

258 **Seminar in Historiography (3)** Dumbadze

The development of art history as a discipline from the eighteenth century to the present. An investigation of different art historical methodologies, including formal analysis, iconological, feminist, Marxist, semiotic and deconstructivist approaches.

286 **Museum Preventive Conservation I (3)** Staff

Same as Anth/MStd 232.

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| 287 | Museum Preventive Conservation II (3) | Staff |
| | Same as Anth/MStd 233. | |
| 298 | Independent Research in Art History (3) | Staff |
| 299 | Museum Internship (3 to 6) | Staff |

FINE ARTS

Note: All fine arts courses may be repeated for credit with approval of the department. A course fee is charged for all fine arts courses listed here except FA 295 and 299–300.

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| 231 | Ceramic Sculpture (3) | Ozdogan |
| | Developing an understanding of the sculptural ceramic form that integrates both quality and creativity. Techniques in hollow and solid construction. Varied temperature firings in reduction and oxidation atmospheres. | |
| 233 | Architectural Ceramics (3) | Ozdogan and Staff |
| | Advanced studies in ceramic murals and sculptures designed for indoor and outdoor architectural concepts. Laboratory tests and activities. | |
| 239 | Special Topics: Ceramics (3) | |
| 249 | Special Topics: Sculpture (3) | |
| 250 | Drawing III (3) | Wright and Staff |
| | Advanced investigation of drawing as an organizing tool for thought, analysis, and personal imagery. Traditional and contemporary approaches to topics related to perceptual and conceptual concerns. | |
| 251 | Advanced Drawing Techniques (3) | Wright and Staff |
| | Investigation of the common concerns and creative processes that have dissolved boundaries between drawing and painting in the late 20th century. | |

- 259 **Special Topics: Drawing (3)**
- 260 **Figure Painting: Observation and Gesture (3)** Brown and Staff
Consideration of the process of vision as mediated through manipulation of paint to form an image. Development of solutions to clarity, articulation, energy, and finish.
- 261 **Problems in Color (3)** Staff
Exploration of the objective rationale and subjective experience of color through the execution of problems in color contrast and color scales.
- 262 **Painting: Contemporary Issues (3)** Brown and Staff
Examples from contemporary art serve as starting points for discussion of the creative process. Postmodern strategies to rethink and challenge various hierarchies of subject, style and medium.
- 269 **Special Topics: Painting (3)**
- 270 **Advanced Photography: Exposure and Printing Techniques (3)** Kessmann and Staff
Pre-visualization, accurate exposure and development, and the craft of black-and-white printmaking. Techniques and strategies for creation of a portfolio that is aesthetically and conceptually engaging.
- 271 **Advanced Photography: Digital Color Printing (3)** Kessmann and Staff
Further development of color theory and the technical skills to make high-quality inkjet prints. Critiques and discussion of contemporary artistic practice.
- 272 **Photography: Contemporary Issues (3)** Kessmann and Staff

Emphasis on the incorporation of contemporary strategies, trends, and approaches into the student's personal practice. The work of contemporary artists who use photography will inform the work produced.

279 **Special Topics: Photography (3)**

280 **New Media: Digital Illustration (3)** Rigg, Stephanic, and Staff

Advanced investigation of two- and three-dimensional drawing and illustration techniques. Print and/or digital portfolio preparation. Prerequisite: FA 71 or permission of instructor.

281 **New Media: Digital Imaging (3)** Rigg, Stephanic, and Staff

Advanced examination of bit-mapped imaging techniques. Methods of electronic dissemination of visual information. Prerequisite: FA 71 or permission of instructor.

282 **New Media: Time-based Visual Expression (3)** Rigg, Stephanic, and Staff

An examination of contemporary two-dimensional animation, video, and multimedia systems and applications, including individual portfolio projects. Prerequisite: FA 71 or permission of instructor.

283 **New Media: Digital Printmaking (3)** Rigg, Stephanic, and Staff

An exploration of digital printmaking techniques, including color profiling.

Prerequisite: FA 71 or permission of instructor.

284 **New Media: Mixed Media (3)** Rigg, Stephanic, and Staff

Combining digital visualization with traditional mediums, artist bookmaking, collage, assemblage, etc., are considered. Prerequisite: FA 71 or permission of instructor.

289 **Special Topics: New Media (3)** Rigg, Stephanic, and Staff

Prerequisite: FA 71 or permission of instructor.

295 **Critical Practices** (3–6) Staff

This structured independent study consists of weekly group critiques that bring together students working in a variety of media. Discussions, which range from practical to aesthetic issues, challenge students to focus and articulate their visual knowledge.

299–300 **Thesis Research** (3–3) Staff

FORENSIC SCIENCES

Professors W.F. Rowe (*Chair*), M.S. Schanfield, E.A. Vincze

Associate Professor N.T. Lappas

Assistant Professors E.M. Robinson, D. Podini

Professorial Lecturers M.M. Christian, J.G. Jackson, H. Deadman, M. Heaney, W.E. Clancy, D.C. Mount, D.I. Salem, M.J. Bonanno, J.E. Miller, J. Trump, M.R. Parker, K.V. DiGregory, H.R. Weisman

Master of Forensic Sciences—Required: the general requirements stated under Columbian College of Arts and Sciences. The program of study consists of 36 credit hours, including ForS 211, 212, 221, 222 or 223; 9 credits selected from ForS 201, 202, 203, 204, 206, 207, 208; 9 credits selected from ForS 234, 236, 254, and 256; 6 elective credits chosen in consultation with the departmental advisor; and successful completion of a Master's Comprehensive Examination.

Master of Forensic Sciences with a concentration in crime scene investigation—Required: the general requirements stated under Columbian College of Arts and Sciences. The program of study consists of 36 credit hours, including ForS 207, 212, 221, 223, 251, 252, 253, 256, 257; 9 elective credits chosen in consultation with the departmental advisor; and successful completion

of a Master's Comprehensive Examination. Note that ForS 211 may not be taken for credit toward this program.

Master of Forensic Sciences with a concentration in forensic chemistry—Required: the general requirements stated under Columbian College of Arts and Sciences. The program of study consists of 36 credit hours, including ForS 206, 211, 221, 223, 234, 235, 238, 239; 12 elective credits chosen in consultation with the departmental advisor; and successful completion of a Master's Comprehensive Examination. The program may include an optional thesis.

Master of Forensic Sciences with a concentration in forensic toxicology—Required: the general requirements stated under Columbian College of Arts and Sciences. The program of study consists of 36 credit hours, including ForS 211, 212, 221, 223, 231, 232, 234, 235, 236, 237; 6 elective credits chosen in consultation with the departmental advisor; and successful completion of a Master's Comprehensive Examination. The program may include an optional thesis.

Master of Forensic Sciences with a concentration in forensic molecular biology—Required: the general requirements stated under Columbian College of Arts and Sciences. Prerequisite: a bachelor's degree from an accredited college or university with a major in biological sciences. The program consists of 36 credit hours, including ForS 201, 211, 221, 223, 228, 241, and 242; 15 elective credits chosen in consultation with the departmental advisor; and successful completion of a Master's Comprehensive Examination. The program may include an optional thesis.

Master of Forensic Sciences with a concentration in high-technology crime investigation—Required: the general requirements stated under Columbian College of Arts and Sciences. Prerequisite: ForS 115, 116, 117, 118, and 119, or equivalents. The program of study consists of

36 credit hours, including ForS 259, 261, 262, 264, 265, 273, 277, 279, and 285, plus 9 credits of electives chosen from ForS 268, 269, 271, 274, 278, 280, 281, 282, 283, 290, 295, 298.

Master of Forensic Sciences with a concentration in security management—Required: the general requirements stated under Columbian College of Arts and Sciences. Prerequisite: ForS 115, 116, 117, 118, and 119, or equivalents. The program of study consists of 36 credit hours, including ForS 260, 261, 262, 264, 265, 266, 267, 273, and 284, plus 9 credits of electives chosen from ForS 263, 268, 269, 270, 271, 286, 290, 295, and 298.

In addition to the degree programs listed here, a graduate certificate in forensic investigation is available.

Note: ForS 115–119 are available only to students conditionally admitted to programs offered by the Department of Forensic Sciences; credit does not apply to any degree programs at GW. ForS 115–119 and 259–286 are offered off campus only.

115 Introduction to Criminal Investigations (3)

Legal aspects of search and seizure; crime scene documentation techniques; fingerprint processing methods; collecting impression evidence; locating and enhancing blood and body fluids; blood spatter pattern analysis.

116 Introduction to Criminal Law (3)

Principles of criminal law and procedure, preparation and presentation of evidence, examination of witnesses, and methods of legal research.

117 Introduction to Organizational Systems for Security Professionals (3)

Fundamentals of management processes in organizations, with emphasis on accounting practice. Organizational structures, strategic planning, information systems, and human resource functions.

118 Introduction to Computer Systems for Security Professionals (3)

Aspects of computer systems and software that directly relate to media analysis, i.e., storage, memory, the structure of file systems, and system peripherals that may contain evidence. Laboratory fee.

119 Introduction to Network Systems for Security Professionals (3)

Aspects of network tools, administrative tools, network protocols, and fundamentals of TCP/IP that can be used to carry out a network-based attack. Development of a working knowledge of how information is processed and can be intercepted on the Internet/Intranet. Laboratory fee.

201 Forensic Biology (3)

Principles of the forensic analysis of blood and other biological materials. Specific procedures and techniques used in forensic biology and serology. Laboratory fee.

202 Instrumental Analysis (3)

Principles and application of various instrumental methods to the examination of physical evidence, including chromatographic and spectroscopic techniques and mass spectrometry. Laboratory fee.

203 Examination of Questioned Documents (3)

Theory and principles of handwriting and handprinting, duplicating processes, paper manufacture and fiber analysis; studies of paper and methods of examining questioned documents. Laboratory fee.

204 Firearms and Toolmark Identification (3)

Methods for identifying firearms, bullet cartridge casings, toolmarks, gunshot residue, obliterated serial numbers, tire marks, and footprints. Laboratory fee.

206 Trace Evidence Analysis (3)

Principles that govern the analysis of trace evidence, including recovery, transference, interpretation, and comparison. Assessment of evidentiary value, reporting, and court testimony. Laboratory fee.

207 Photography in the Forensic Sciences (3)

Basic use of forensic photography, including selection and use of equipment, photographs as evidence, close-up work, and common misconceptions. Laboratory fee.

208 Terrorism (3)

An analytic framework for the interpretation of concepts, goals, strategies, and targeting of international terrorist groups. The evolution of international and U.S. counterterrorism strategies.

211 Physical Aspects of Forensic Sciences (3)

Survey of forensic physical sciences; fingerprints, firearm and toolmark examinations, document examinations, and examinations of trace evidence, such as glass, soil, paint, hairs, and fibers; crime scene investigations; qualifications and preparation of expert witnesses; operation and functioning of the forensic science laboratory. Laboratory fee.

212 Biological Aspects of Forensic Sciences (3)

Principles of forensic serology, molecular biology, population biology, wildlife biology, entomology, anthropologic pathology, and toxicology. The role of the forensic laboratory in the identification of human remains; determination of the time,

cause, and manner of death. This course cannot be taken for credit toward the forensic molecular biology concentration.

221 Criminal Law I (3)

Principles of criminal law and procedure, preparation and presentation of evidence, examination of witnesses, and methods of legal research.

222 Criminal Law II: Evidence (3)

Procedural rules affecting the collection and use of physical evidence. Emphasis on court opinions defining the rules of search and seizure and admissibility of evidence.

Prerequisite: ForS 221.

223 Criminal Law III: Moot Court (3)

Students prepare and present direct testimony and are cross-examined by an experienced trial attorney in simulated courtroom setting. Class discussions of problems, techniques. Lectures on discovery, admissibility of scientific evidence, chain of custody, use of notes, etc. Prerequisite: ForS 221.

228 Population Genetics (3)

Same as BiSc 228.

231 Principles of Toxicology (3)

Concepts of toxicology, including its historical development and modern applications, drug disposition, mechanisms of toxicity; factors that influence toxicity and toxicity evaluation.

232 Analytical Toxicology (3)

Principles and procedures used in the isolation, identification, and quantitation of drugs of abuse from human samples. Prerequisite: ForS 202 or permission of instructor.

234 Medicinal Chemistry I (3)

Theory and principles of classification, synthesis, and structure activity relationships of drugs. Discussion of the complex chemical events that take place between administration of a drug and its action on the user, with emphasis on drugs of abuse.

235 Medicinal Chemistry II (3)

Chemical, pharmacological, toxicological, and pathological characteristics of commonly abused drugs, including ethanol, barbiturates, narcotics, stimulants, and hallucinogens.

236 Forensic Toxicology I (3)

Biological, chemical, and pharmacological principles that underlie forensic toxicology. Prerequisite: ForS 235 or permission of instructor.

237 Forensic Toxicology II (3)

Lectures, student seminars, and projects dealing with topics of current interest in forensic toxicology. Prerequisite: ForS 236 or permission of instructor.

238 Forensic Chemistry I (3)

Examination of glass and soils. Laboratory exercises include refractive index measurements using immersion methods; polarized light observations of minerals; x-ray diffraction analysis of minerals; and classical chemical and physical methods of analysis. Prerequisite: ForS 202 or permission of instructor. Laboratory fee.

239 Forensic Chemistry II (3)

Examination of arson accelerants, textile fibers, plastics, and paints. Laboratory exercises include infrared spectrometry and pyrolysis–gas–liquid chromatography of polymeric materials, as well as classical chemical and physical methods of analysis.

Prerequisite: ForS 238 or permission of instructor. Laboratory fee.

241 Forensic DNA Profiling (3)

Techniques of molecular biology applied to the collection, examination, analysis, and interpretation of biological evidence.

242 Forensic Molecular Biology (3)

Advanced methods of forensic molecular biology. Laboratory examinations and classifications of dried blood and other biological materials through a variety of nuclear and mitochondrial markers. Laboratory fee. Prerequisite: ForS 241 and permission of instructor.

250 Crime Scene Investigation for Lab Personnel (3)

A condensed offering of the subject matter of ForS 251–52. ForS 250 cannot be taken for credit toward the crime scene investigation concentration. Laboratory fee.

251–52 Crime Scene Investigation I–II (3–3)

Examination, analysis, and reconstruction of crime scenes. Principles from biology, chemistry, and physics applied to identification, documentation, preservation, and collection of physical evidence. Laboratory fee. ForS 251 is prerequisite to ForS 252.

253 Homicide Investigation (3)

How an examination of the suspect–victim exchange can lead to an understanding of the offender’s motivations. How examination of the forensic evidence can lead not only to the suspect’s motives but also to the suspect.

254 Forensic Psychiatry (3)

Introduction to the constructs of dynamic psychiatry, psychiatric treatment, and the nomenclature of mental disorders. Consideration of expert testimony, direct examination, and cross-examination in hospitalization and criminal cases.

255 Investigation of Child Abuse (3)

This course integrates medical, scientific, psychological, sociological and legal information for investigators and professionals involved in the field of child abuse. Special emphasis will be placed on the application of research-supported data to situations involving the murder, abuse and exploitation of children.

256 Forensic Pathology (3)

Terminology and scientific techniques used in medico-legal investigations, sudden or unexpected deaths, homicides, suicides, accidental deaths, and trauma.

257 Medicolegal Death Investigation (3)

Medical, scientific, sociological, and legal methodologies applied to forensic investigations. Aspects of death scene analysis by a medical examiner, including autopsy procedures, unidentified remains, child death investigations, and mass disaster investigations. Prerequisite: ForS 256 and permission of instructor.

259 Computer-Related Law (3)

A problem-oriented course that focuses on applying the holdings of cases and analysis of statutes to different criminal fact patterns. The course is designed to examine criminal law, criminal procedures, and evidence as it relates to computer crime and the collection/analysis of digital evidence. Open only to students enrolled in off-campus forensic sciences programs.

260 Security Case Law (3)

Negligence and liability, international torts, compensatory and punitive damages, and contract law. The exercise of security functions by private individuals and organizations.

261 Security Management (3)

An overview of the factors that shape modern security management: technology, law, ethics and societal changes. The course focuses on risk assessment and the necessity to identify, analyze, and counter threat.

262 Risk Analysis and Loss Prevention (3)

An overview of the risk analysis process: how security threats and vulnerabilities are identified and quantified; how controls and countermeasures are evaluated and prioritized. Principles of loss prevention and the protection of assets.

263 Issues in Crisis and Disaster Management for Security Professionals (3)

Theoretical and practical considerations that surround a specific crisis or disaster situation. Practical approaches for securing assets vulnerable to these threats.

Situational exercises. Open only to students enrolled in off-campus forensic sciences programs or by approval of the program director.

264 Protection of Information Systems (3)

An overview of the types of information assets that need protection from loss. Basic techniques covered include: effective protection of automated information, including backup, disaster management, and intrusion detection.

265 Ethics and Leadership (3)

The ethical dimensions of business issues faced by security professionals:
employer/employee relations, loyalty, privacy, the professional use of technology,
and ethics in a global environment.

266 Emergency Planning and Business Continuity (3)

Approaches used to develop effective plans for managing emergency situations and
ensuring business continuity when disasters occur.

267 Organizational Behavior for Security Professionals (3)

Basic concepts of individual, group, and organizational behavior. Specific
management and leadership models and approaches to workplace crime problems.
Case studies in a variety of organizational settings.

268 Industrial Espionage and Corporate Privacy Issues (3)

Countermeasures to protect intellectual capital and physical asset from competitors.
Methods used to collect information on businesses and to neutralize threats to
corporations and government. The role of the security professional in protecting
individual privacy and sensitive and/or proprietary information within organizations.
Open to departmental degree candidates only.

269 Corporate Fraud (3)

Common types of corporate fraud and internal controls to prevent and/or detect fraud.
Elements of corporate conspiracy.

270 Security Contracting with Federal and State Entities (3)

Federal and state procurement practices from the viewpoint of a prospective security
service provider.

271 Forensic Psychology (3)

Application of principles of psychology in civil and criminal proceedings: determining criminal responsibility, competence to stand trial, and testamentary capacity; jury selection.

273 Research Methods for Security Professionals (3)

Identifying research resources; critical analysis vs. descriptive reports; applying appropriate measurement instruments, quantitative and qualitative research methods; written and oral presentation skills. Students develop and present a professional research report or a response to a request for research proposal.

274 Video Forensic Analysis (3)

Examines the principles of digital forensic analysis applied to forensic investigation and how to use these technologies to identify fraudulent and criminal activities. Open to departmental degree candidates only.

277 Computer Forensics I: Investigation and Data Gathering (3)

Techniques used to detect computer crime and gather probative evidence to secure conviction under federal law. Open only to students enrolled in the department or by approval of the program director. Laboratory fee.

278 Computer Forensics II: Evidence and Analysis (3)

Threats to, and vulnerabilities of, computer systems and how to minimize them. Open only to students enrolled in the department or by approval of the program director. Laboratory fee.

279 Intrusion I: Understanding and Identifying Network-Based Attacks (3)

Computer network operations and network-based computer crime. Fraud schemes related to electronic commerce, theft of sensitive computer information, compromise

of computer networks, and identity theft. Elements of proof of network-based crime are discussed. Prerequisite: ForS 264 or equivalent. Laboratory fee.

280 Intrusion II: Investigating Network-Based Attacks (3)

Detecting and responding to network- and host-based intruders, integrating intrusion detection systems into network topologies, identifying methods hackers use to break into network systems, analyzing network traffic and detecting attacks, and creating an effective response strategy. Prerequisite: ForS 279. Laboratory fee.

281 Forensic Accounting (3)

Principles of accounting: abuse and misuse of accounting procedures; use of accounting in the investigation of commercial crime.

282 Telecommunication Systems for Security Professionals (3)

Telecommunication systems infrastructure and operation. How telecommunication and computer systems are used in tandem to commit computer crime. Assessing and managing threats and vulnerabilities. Open only to students enrolled in the department or by approval of the program director.

283 Steganography and Electronic Watermarking (3)

Digital data hiding techniques. Investigation of data hiding and labeling techniques, attacks against steganography and watermarked information; countermeasures to such attacks. Open only to students enrolled in the department or by approval of the program director. Laboratory fee. Prerequisite: ForS 277, 278.

284 Security Management Capstone Course (3)

Case study review of best practices in security management and development of measurable performance criteria for evaluating cost/benefit of a security program.

Evaluations drawn from public and private sectors and proprietary and contract security services. Students design, develop, and evaluate a complete security system.

285 High Technology Crime Investigation Capstone Course (3)

For students in the final semester of the high-technology crime investigation program only. Simulation of a computer forensic investigation: developing an investigation plan, securing the crime scene, analyzing evidence, preparing the case for court, and testifying in a moot court situation. Laboratory fee.

286 Personnel Security (3)

Principles of personnel security: personnel security investigations and pre-employment screening. Assertive behaviors to keep the workplace safe and avoid liability exposure to negligent hiring.

290 Selected Topics (3)

Current issues in research, investigation, and law.

295 Research (arr.)

Research on problems approved by the department, under the supervision of an appropriate member of the program faculty. Admission by permission only.

298 Forensic Sciences Practicum (arr.)

Internship experience in a forensic science laboratory or criminal justice agency, under the supervision of an appropriate member of the program faculty. Students must preregister for this course. Admission by permission only.

299–300 Thesis Research (3–3)

GEOGRAPHY

Professor G.C. Stephens

GW Graduate Bulletin 2009

Associate Professors M.D. Price (*Chair*), E. Chacko, L.M. Benton-Short

Assistant Professors D. Rain, R. Engstrom, M. Atia, M. Keeley

Adjunct Professor J.P. Dymond

Professorial Lecturers L. Marcus, I. Cheung, J. Cromartie

Lecturer G. Hofmann

Master of Arts in the field of geography—Prerequisite: a bachelor's degree with a major in geography or in a related field in the social or natural sciences.

Required: the general requirements stated under Columbia College of Arts and Sciences.

Course work must include Geog 201 and 221.

Thesis and nonthesis options are available: The thesis option requires a minimum of 30 credit hours of course work, including Thesis Research; the nonthesis option requires completion of 36 credit hours of graduate work. All degree candidates must take a Master's Comprehensive Examination.

Students entering the program without a bachelor's degree with a major in geography will be required to take prerequisite courses as determined by the department. All entering students must have completed one course, or its equivalent, from each of the following groups: environmental geography (Geog 108, 132); population/cultural/political geography (Geog 127, 145, 146); urban geography (Geog 125, 140, 141).

Depending upon the chosen field of specialization, each student will select electives from appropriate courses within the department or from related programs and departments within the University or the Consortium of Universities. The student's program of study will be developed in consultation with the advisor and graduate committee.

With permission, a limited number of 100-level courses in the department may be taken for graduate credit; additional course work is required. See the Undergraduate Programs Bulletin for course listings.

201 **Geographic Thought and Methods (3)** Rain

For first-year master's students, a survey of geographic thought, theories, and methods. Emphasis on contemporary issues in geography and urban planning and on the development of research.

207 **Urban Planning and Development (3)** Keeley

Selected problems in urban and regional planning in the developing world: applications of zoning, environmental controls, and other techniques for achieving sustainable urban development.

208 **Land Use and Urban Transportation Planning (3)** Marcus

Relationships between land use and the movement of goods and people. Examination of land use and transportation planning principles, issues, and techniques. Roles of public and private interests in land use and transportation planning and management.

219 **Seminar: Urban Climate (3)** Staff

Inadvertent climate modification due to urbanization and impacts on environmental and human health.

220 **Seminar: Climatic Change (3)** Staff

Examination of natural and human-induced climatic change, at global, regional, and local scales.

221 **Geospatial Techniques (3)** Engstrom

Integration of GIS, remote sensing, and spatial modeling. Same as EMSE 249.

- 222 **Seminar: Resources and the Environment (3)** Staff
- Topics related to the spatial variations and interrelationships of resources and the environment; applications of geographic information systems and remote sensing.
- Prerequisite: permission of instructor. Laboratory fee.
- 223 **Seminar: Population and Health (3)** Chacko
- Interrelationships between population and the environment and impacts on human health.
- 224 **Seminar: Political Geography (3)** Dymond
- Examination of political factors in location theory and analysis of the nature of political territories and conflict.
- 225 **Seminar: Transportation and Development (3)** Marcus
- Transportation and communication in the organization of space.
- 230 **Seminar: Environmental Issues in Development (3)** Rain
- A consideration of the differential regional implications of and responses to resource and environmental policy decisions due to regional differences in societal and physical parameters.
- 243 **Seminar: Urban Geography (3)** Benton-Short, Rain
- Topics concerning social, political, economic, and environmental issues in U.S. cities.
- 244 **Seminar: Urban Sustainability (3)** Benton-Short, Keeley
- Urban sustainability and environmental issues in developed and developing cities.
- 250 **Geographical Perspectives on Development (3)** Chacko, Atia
- Theory and debates surrounding economic development in a globalizing world, with case studies.

- 261 **Geographical Perspectives on Latin America (3)** Price, Dymond
Natural resources, the environment, and population dynamics through time.
- 265 **Seminar: Geography of the Former Soviet Union (3)** Staff
Survey of the regions and major topical themes of the geography of the former Soviet Union, including population, energy, agriculture, transportation, and regional development.
- 290 **Principles of Demography (3)** Boulrier
Same as Econ/Soc/Stat 290.
- 291 **Methods of Demographic Analysis (3)** Boulrier
Same as Econ/Soc/Stat 291.
- 293 **Special Topics (3)** Staff
Consideration of geographic aspects of topical social or environmental problems.
May be repeated for credit provided the topic differs.
- 295 **Research (arr.)** Staff
May be repeated for credit.
- 299–300 **Thesis Research (3–3)** Staff

HISTORY

University Professor V.N. Gamble

Professors R. Thornton, P.F. Klarén, R.E. Kennedy, Jr., W.H. Becker, L.P. Ribuffo, E.

Berkowitz, R.H. Spector, L.L. Peck, R.J. Cottrol, D.K. Kennedy, A.M. Black (*Research*), M.A.

Atkin, T. Anbinder (*Chair*), H.L. Agnew, A.J. Hildebeitel

Associate Professors R.B. Stott, E.A. McCord, C.E. Harrison, D.R. Khoury, J. Hershberg, D.

Yang, S. McHale, H.M. Harrison, E.H. Cline, N. Blyden, A. Zimmerman, M. Norton, D.

Silverman, G.A. Brazinsky

Assistant Professors N.G. Seavey (*Research*), C. Klemek, S.N. Robinson, J. Malegam, D.

Schwartz

Adjunct Professors K. Bowling, A.L. Alexander, A. Howard

Professorial Lecturers S. Wells, C.T. Long

Master of Arts in the field of history—Prerequisite: a bachelor's degree from an accredited college or university with a major in history, or with substantial course work in history of high academic quality; high scholastic standing; and approval of the department.

Required: the general requirements stated under Columbian College of Arts and Sciences and reading knowledge of one foreign language. The program consists of a minimum of 36 credit hours of 100- and 200-level courses, including at least six 200-level courses. Students choosing the thesis option take Hist 299–300 as part of the 36 credits but in addition to the required six 200-level courses. Students choosing the non-thesis option must write two research papers in the course of completing their program. See the Undergraduate Programs Bulletin for a listing of 100-level courses offered by the department. A maximum of 6 credits may be in approved courses outside the History Department. To receive graduate credit for 100-level courses, master's candidates must arrange for extra work with the instructors. Each student completes a major field in which at least 9 credits of course work must be taken. Major fields are listed below, under the Doctor of Philosophy in the field of history. Students in all history M.A. programs must maintain a GPA of at least 3.3 both to remain in good standing and to earn the degree.

Master of Arts in the field of history with a concentration in historic preservation—

Required: the general requirements stated under Columbian College of Arts and Sciences. This 36-credit degree program combines courses in United States history and historic preservation. It includes at least 18 credits of U.S. social history, U.S. urban history, man-made America, and the seminar sequence in historic preservation.

Master of Arts in the field of history with a concentration in imperial and colonial studies—

Required: the general requirements stated under Columbian College of Arts and Sciences. This 36-credit degree program emphasizes the comparative study of empires. Hist 242 and 243 are required, along with a 15-credit major regional field and a minor regional field of 6 to 9 credits. Up to 9 credits may be chosen in related disciplines within the University.

*Master of Arts in the field of history with a concentration in public policy—*Required: the general requirements stated under Columbian College of Arts and Sciences. This 36-credit degree program emphasizes the study of history as it relates to the analysis and conduct of public policy. Hist 214 and an internship done in conjunction with Hist 219 are required. One-third of the course work is taken outside the History Department in a discipline relevant to the student's policy interests.

*Master of Arts in the field of history with a concentration in U.S. legal history—*Required: the general requirements stated under Columbian College of Arts and Sciences. This 36-credit degree program combines a major field in U.S. history with a focus in U.S. legal history. Students may take up to 9 credits of legal history offered by the Law School.

*Doctor of Philosophy in the field of history—*Required: the general requirements stated under Columbian College of Arts and Sciences, including the satisfactory completion of the General

Examination. Some students must pass language exams appropriate to their field and dissertation topic. Students must maintain a GPA of at least 3.5 to remain in the program.

Candidates in American history must select two major fields from early America (to 1815), 19th-century America (1815–1900), and 20th-century America (1900–). The minor field will normally be topical (e.g., U.S. social, U.S. diplomatic, historic preservation).

Candidates in imperial and colonial history take Hist 242 and 243 and select two major and one minor field. Fields can include, but are not limited to, such combinations as Europe and the Americas (1500–1900), Europe and Asia, Europe and the Middle East, Europe and Africa, the U.S. and Asia, and China and Japan.

Candidates in Asian history select two major fields from modern China, modern Japan, modern Korea, and modern Southeast Asia. The minor field is chosen in consultation with the advisor.

Candidates concentrating in areas other than those outlined above must select one major and two minor fields. Major fields are early modern Europe, modern Europe, Latin America, modern Middle East, modern Eastern Europe, modern Russia, and military history. The minor fields may be either topical (e.g., European intellectual) or chronological (e.g., Tudor and Stuart England, colonial Latin America).

All candidates may choose to be examined in one minor field other than history if it is relevant to the program of study.

Doctor of Philosophy in the field of American religious history (offered in cooperation with the Department of Religion)—Required: the general requirements stated under Columbian College of Arts and Sciences and the specific requirements of the Doctor of Philosophy in the field of history, stated above. The General Examination must include one of the major American

fields listed above and one from the Department of Religion (typically history of religion in America).

Note: Undergraduates may register for graduate courses only with permission of the instructor.

- | | | |
|-------|---|---------------------|
| 201 | History and Historians (3) | Zimmerman, Schwartz |
| | Historiography and historical method for graduate students. Readings and discussions on major trends in history; selections from classics of historical literature. | |
| 203 | Teaching History (3) | Anbinder, Zimmerman |
| | Pedagogic techniques and strategies particular to the discipline. Admission by permission of instructor. | |
| 205–6 | Eastern European History (3–3) | Agnew |
| | Hist 205: 1772–1918; Hist 206: 1919–1945. | |
| 211 | Western Representations of Africa (3) | Blyden |
| | Representations of Africa by non-Africans from the earliest contact to more recent encounters. | |
| 214 | History and Public Policy (3) | Berkowitz |
| | Seminar in the use of historical insights and methods in policymaking, with emphasis on domestic issues. Assessment and use of primary sources for policy analysis and the use of historical analogy in policy formulation. | |
| 217 | Russian and Soviet Thought (3) | Atkin |
| | Selected topics in the intellectual and cultural history of 18th- to 20th-century Russia and Soviet Union. May be taken as a readings seminar or, with instructor's approval, as a research seminar. Admission by permission of instructor. | |

219 **Internship in History and Public Policy** (3 or 6) Berkowitz

Supervised participation in an office or agency concerned with the formulation of public policy; terms of the internship are arranged with the director of the history and public policy program. Enrollment restricted to students in the history and public policy program.

220 **American Business History** (3) Becker

The history of American business institutions in manufacturing, distribution, transportation, and finance. Particular attention will be given to the period since industrialization, with consideration of business institutions in their economic, legal, governmental, and social contexts. Same as SMPP 293.

221 **History of International Economic Systems** (3) Becker

Development of arrangements and institutions designed to manage the international economy since the 19th century, with a focus on the period since World War II.

224 **European Intellectual History** (3) E. Kennedy

Topics in 18th- and 19th-century European thought, with an emphasis on France. Specific topic announced in the Schedule of Classes.

228 **Topics in Modern Military and Naval History** (3) Spector

Discussion, readings, and research in 20th-century European and American military and naval history.

229 **World War II** (3) Spector

Examination of statecraft and the management of force before, during, and after World War II. Special attention to broad aspects of military policy and strategy and their interaction with international politics and diplomacy.

- 230 **Strategy and Policy (3)** Spector
A study of the historical development of strategy and the relationship of military thought to national policy.
- 231 **The Age of the Battleship:
An Introduction to Modern Naval History (3)** Spector
The rich and varied literature of naval history, with emphasis on interactions among technology, nationalism, and domestic political/social developments in the late 19th and early 20th century. The social history of navies is included.
- 232 **Islam and Social Movements (3)** Khoury
An examination of the relationship of religion and religious symbols to social and political movements in the Islamic world.
- 233 **Nationalism in the Middle East (3)** Khoury
Different interpretations of nationalism and their applicability to nationalism in the Middle East.
- 234 **Imperialism in the Middle East (3)** Khoury
An exploration of the process of European and American expansion in the Middle East.
- 237 **Soviet Foreign Policy, 1917–1991 (3)** H. Harrison
Concepts and perceptions guiding Soviet relations with the outside world. From the blockade and intervention, through years of isolation, World War II, the Cold War, to “peaceful coexistence.”
- 238 **Early Modern Britain (3)** Peck

Analysis of some current issues in early modern historiography; contextualization of recent works in the field; consideration of different methodologies and the types of evidence on which they rely or that they illuminate.

- 239 **Early Modern European History** (3) Staff

Topics selected from Western European history of the 14th through 17th centuries.

- 240 **English People and Institutions** (3) Peck

Selected topics in the political, social, intellectual, and economic history of England.

Focus upon one time period and special area of interest. May be taken for research credit with instructor's approval.

- 241 **Modern European History** (3) Staff

- 242 **Europe and the World, 1500–Present** (3) D. Kennedy

An introduction to some of the key debates and scholarship concerning European imperialism.

- 243 **Modernization, Imperialism, Globalization** (3) Zimmerman

Readings seminar in classic and recent theories of modernization, imperialism, and globalization.

- 244–45 **Gender, Sexuality, and American Culture** (3–3) Staff

Same as AmSt 244–45.

- 246 **History of Modern Russia and the Soviet Union** (3) Atkin

Selected topics in the domestic history of modern Russia and Soviet Union. May be taken as a readings seminar or, with instructor's approval, as a research seminar.

- 251 **Uses of History in International Affairs** (3) H. Harrison

The multiple interconnections among history, politics, and international affairs, including how policymakers use or misuse “lessons” of history and how countries attempt to deal with difficult aspects of their past. Specific cases may vary.

257 **Re-thinking Cold War History (3)** H. Harrison, Hershberg

A reading and research course that relies heavily on documents from formerly closed communist archives and recently declassified Western materials. Various issues and events of the Cold War; old and new historiographical controversies. Students write a primary-source research paper to elucidate one of the many aspects of the Cold War about which new evidence is available.

261–62 **Topics in Modern Latin America (3–3)** Klarén

264 **Immigration and Ethnicity in the United States (3)** Anbinder

Trends and theoretical issues in the study of American immigration and ethnicity.

265 **The Era of the Civil War, 1850–1877 (3)** Anbinder

The sectional crisis that led to the Civil War; the conflict itself in its military, political, and social dimensions; attempts at racial and sectional reconciliation made during Reconstruction.

267 **American Social Thought Since World War II (3)** Ribuffo

Consideration of C. Wright Mills, Daniel Bell, Abraham Maslow, Christopher Lasch, Paul Goodman, Martin Luther King, Jr., Barbara Ehrenreich, and other major social critics.

268 **Readings in American Cultural History (3)** Staff

Same as AmSt 268.

269 **Religion and American Culture (3)** Staff

Same as AmSt 269.

- 270 **Theory and Practice of Public History (3)** Staff

Same as AmSt 270.

- 271 **Race in America (3)** Staff

Same as AmSt 271.

- 272 **American Social Movements (3)** Staff

Same as AmSt 272.

- 273 **Readings on Women in American History (3)** C. Harrison

Important works in American women's history; evolution of the field in historiographical context. Same as AmSt/WStu 273.

- 274 **Readings in 19th-Century American History (3)** Anbinder, Stott

Important trends in historical writing about 19th-century America.

- 275 **Colonial North America (3)** Silverman

The complex and turbulent world of colonial North America from the late 16th to the late 18th century. Inter-cultural negotiations, Atlantic world connections, imperial conflict, gender construction, and race consciousness.

- 276 **Revolutionary America (3)** Silverman

The political and social conditions of the revolutionary era: the spiral of events that led to the American independence movement, the various meanings of the war to its participants, and the consequences of victory for the nation, its various subgroups, and other peoples of the colonial Atlantic world.

- 277–78 **Historic Preservation: Principles and Methods (3–3)** Longstreth

Same as AmSt 277–78.

- 279 **American Indian History to 1890 (3)** Silverman
North American Indian history from indigenous societies on the eve of first contact with Europeans until the conclusion of the Great Plains Wars of the late 19th century.
- 281 **Cityscapes (3)** Staff
Same as AmSt 281.
- 282 **History of U.S. Foreign Policy, 1898–1980 (3)** Hershberg
Readings, lectures, discussion on major developments in the conduct of American diplomacy.
- 283–84 **Readings/Research Seminar: Recent U.S. History (3–3)** Ribuffo
Prerequisite: 6 credit hours of 100-level American history courses. Research or readings, depending on students' interests and curricular needs.
- 285 **U.S. Legal History (3)** Cottrol
The legal history of the United States from the 17th century to the present. The course examines legal change within the broader context of political, social, and economic change. Admission by permission of instructor. Same as Law 591.
- 286 **The Law of Race and Slavery (3)** Cottrol
The role of legal norms and processes in developing patterns of slavery and race relations in the United States and other societies. Admission by permission of instructor. Same as Soc 286 and Law 596.
- 287 **U.S. Urban History (3)** Staff
Same as AmSt 287.
- 288 **Modern Southeast Asia (3)** McHale

- The modern history of Southeast Asia from the 1800s to 1975. Colonialism, rise of postcolonial states, revolutions and persistence of the past.
- 289 **Modern Japanese History (3)** Yang
- Selected topics in modern Japanese history from the Meiji Restoration of 1868 to the present. Research or readings depending on students' interests and curricular needs.
- 290 **Independent Readings/Research (3)** Staff
- Written permission of instructor required. May be repeated for credit with permission.
- 291 **20th-Century European History (3)** Staff
- Research or readings on selected topics.
- 294 **The Modern Middle East (3)** Khoury
- Readings, discussion, and research in selected political, economic, social, cultural, and intellectual trends.
- 295 **Readings Seminar: Late Imperial China (3)** McCord
- Selected topics in the history of modern China in the late imperial period, with a particular focus on the internal and external challenges to the last Chinese dynasty in the 19th century.
- 296 **Readings Seminar: 20th-Century China (3)** McCord
- Selected topics in the history of modern China from the 1911 Revolution to the Cultural Revolution.
- 297 **Special Topics Seminar (3 to 9)** Staff
- Open to doctoral and master's candidates and qualified undergraduates. May be repeated for credit provided the topic differs.
- 298 **Topics in Korean History (3)** Brazinsky

Intensive exploration of the history of Korea in modern times (1850–present). Korean identity and the challenges of foreign imperialism, industrialization, modernization, and globalization.

299–300 **Thesis Research** (3–3) Staff

301–2 **Folger Institute Seminars** (3–3) Staff

Topics will be announced in the Schedule of Classes. May be repeated for credit provided the topic differs. Consult the chair of the department before registration.

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit.

HOMINID PALEOBIOLOGY

Committee on Hominid Paleobiology

B. Wood (*Chair*), K. Behrensmeyer, R. Bernstein, A. Brooks, W. Graf, P. Lucas, D. Piperno, R. Potts, B. Richmond, C. Sherwood, M. Zeder

Columbian College of Arts and Sciences offers an interdisciplinary program leading to the degrees of Master of Science and Doctor of Philosophy in the field of hominid paleobiology.

Participating faculty are drawn from the Departments of Anthropology, Biological Sciences, and Anatomy and Regenerative Biology at GW; the Departments of Anthropology and Paleobiology at the National Museum of Natural History, Smithsonian Institution; the Department of Physiology and Biophysics at Howard University; and the National Institutes of Health.

A bachelor's degree in anthropology, biology, geoscience, or zoology from this University, or an equivalent degree from another accredited institution of higher learning, is required for admission into the program. Prerequisites include the following.

1) Advanced undergraduate course work in biology, including courses in evolution and any two of the following: genetics, developmental biology/embryology, anatomy, physiology, ethology, ecology, and paleontology. GW courses that correspond to these subjects are BiSc 107, 108, 114, 122, 123, 132, 150, 151, 152, 154, 156.

2) Advanced undergraduate course work in anthropology, including courses in any two of the following: osteology, human biology, paleoanthropology, primatology, and Paleolithic archaeology corresponding to Anth 114, 141, 142, 145, 146, 147, 148, 149, 181, 183; course work in statistics corresponding to Stat 91 and 127; course work in mathematics, including precalculus, corresponding to Math 20–21 or 30.

In addition, advanced undergraduate course work in one or more of the following subjects is desirable: chemistry, biochemistry, physics, geoscience, and calculus.

Exceptional applicants who lack some of the prerequisites may be admitted to the program on a provisional basis, but formal admission will be conditional on the satisfactory completion of appropriate deficiency courses in the first year.

Master of Science in the field of hominid paleobiology—Required: the general requirements stated under Columbian College of Arts and Sciences. The program includes 30 credit hours of course work, plus a thesis (equivalent to 6 credit hours). Required courses include HomP 201; Anth 147, 283; BiSc 210; and two laboratory or field research courses in different disciplines. Electives are selected in consultation with the committee from a list of relevant courses in anatomy, anthropology, biological sciences, and geoscience.

Doctor of Philosophy in the field of hominid paleobiology—Required: the general requirements stated under Columbian College of Arts and Sciences. The program includes a minimum of 48 credit hours of course work, plus a dissertation (equivalent to 24 credit hours). Required courses are HomP 201, 301, 302, 303; Anth 283; and a course in each of the following: genetics, geoscience or vertebrate paleontology, animal behavior or ecology, and statistical methods. The remainder of the course work is to be distributed among various interdisciplinary courses, including but not limited to the following: Anth 142, 241, 243, 244, 247; Anat 210, 212; BiSc 114, 132, 210, 216, 228, 230; Geol 126, 140.

Three of the chosen courses must include a substantial independent research project. These research components must involve at least two different disciplines and may include approved field courses. Electives are to be selected as for the master's degree. For detailed requirements, consult the chair of the doctoral program committee.

Research fields: Any subdiscipline of anatomy, anthropology, biology, ecology, or geoscience that pertains to research in the field of hominid paleobiology. At least one of the student's research fields must be in a discipline other than anthropology.

201 **Hominid Paleobiology (3)** Richmond, Wood

Study of human evolution through investigation of the fossil record; current research in reconstructing paleobiology. Adaptation, phylogeny and behavior reconstruction, site formation, and the taxonomy, site context, anatomy, behavior, and major issues surrounding each hominin taxon.

295 **Research (arr.)** Sherwood

Research on problems approved by the director of the program. Open to qualified students with advanced training. May be repeated for credit.

299–300 **Thesis Research (3–3)**

301 **Problem-Based Learning Seminar (1 to 3)** Staff

Problem-based tutorial in hominid paleobiology. Development of research skills through problem-solving tasks in a small group. May be repeated for credit.

302 **Public Understanding of Science Internship (3)** Richmond, Lucas

Supervised participation in an institution that presents science to the public. Opportunity to participate in procedures and gain practical experience in disseminating scientific information to non-scientists.

303 **Paleobiology Lab Rotation (2 or 3)** Bernstein

Supervised participation in a relevant laboratory. Students learn analytical techniques, handle diverse types of data, and encounter a range of disciplines as preparation for later participation in interdisciplinary research projects. Admission by permission of the program chair. May be repeated for credit.

398 **Advanced Reading and Research (arr.)**

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.

399 **Dissertation Research (arr.)**

Limited to Doctor of Philosophy candidates. May be repeated for credit.

HUMAN DEVELOPMENT and HUMAN AND ORGANIZATIONAL LEARNING

See **Counseling/Human and Organizational Studies**.

IMMUNOLOGY

See **Microbiology and Immunology**.

INFORMATION SYSTEMS AND TECHNOLOGY MANAGEMENT

Professors J.H. Carson, E.J. Cherian, M.J. Granger, E.G. Carayannis

Associate Professors R.G. Donnelly (*Chair*), W.H. Money, J. Artz, S. Dasgupta

Assistant Professors R.A. Lumley, V. Sahasrabudhe, M.D. Haddad, Y. Zhou, W. Duan

See the School of Business for programs of study in business administration leading to the degrees of Master of Business Administration, Master of Science in Information Systems Technology, and Doctor of Philosophy.

226 **Decision Support Systems (3)** Money

Same as DnSc 226.

230 **Management of Technology Innovation (3)** Donnelly

Competitive, economic, and political factors that influence technology innovation in public and private organizations, domestically and internationally. Management of research and development: project selection, resource allocation, technology planning, management of development projects. Quality, manufacturing, and intellectual property issues. (Fall and spring)

232 **International Science and Technology (3)** Carayannis

Technology transfer among advanced countries and LDCs. Comparative science and technology policies and capabilities of countries. Technology basis for international trade, licensing, patenting, and joint ventures. Global transfer of military technologies and export controls. Technology in economic development. (Spring)

233 **Emerging Technologies (3)** Carayannis

Exploration of new developments in scientific and technological innovation, including automation, energy, medicine, bioengineering, social science, information technology, and space. Emphasis on forecasting these technological advances and

- assessing their economic and social effects. The role of advancing technology in driving social change. (Spring)
- 234 **New Venture Financing: Due Diligence and Valuation Issues (3)** Staff
Same as Fina 234.
- 235 **Technology Entrepreneurship and Innovation (3)** Donnelly
The process of innovation and entrepreneurship used to launch and build new ventures. Organizing for innovation, raising venture capital, tax considerations, managing the small technology-based venture, marketing technology. Case studies of recent low- to high-tech ventures. Developing a business plan for a technology-based venture. (Spring and summer)
- 239 **Seminar: Technology Commercialization (3)** Donnelly
Capstone course integrating the field of management of science, technology, and innovation. Commercialization of technology in the private sector and the impact on competitiveness. Implementation of technology in the public sector. Technology development, from new product concept to utilization. Prerequisite: ISTM 230 or 232 or 233 or 235 or permission of instructor. (Summer)
- 240 **Case Studies in Information Systems (3)** Staff
Case studies dealing with information systems management and technology. Strategic and management-related issues on information systems development, implementation, and application. Prerequisite: MBAd 252. (Fall and spring)
- 241 **Information Systems Security (3)** Lumley
Philosophies, principles, and practices of security management in and impact of privacy legislation on computer-based systems. Risk assessment, state-of-the-art

measures, trends in the information security field, and roles of the various levels of management and technological staff. Prerequisite: M.S.I.S.T. candidacy.

(Fall, spring, and summer)

242 **Systems Analysis for Information Systems (3)** Dasgupta, Granger

Development of a specification for an information system. Topics include CASE tools, data gathering, information flow modeling, object-oriented analysis, data file organization, input/output and other nonfunctional requirements. Prerequisite: MBAd 252. (Fall and spring)

243 **Human Factors in Information Systems (3)** Granger

The user–computer interaction, human factors of on-line dialogues, interfacing, and various approaches to user–system interaction. Emphasis on the development and evaluation of user–computer interfaces using software such as Visual BASIC and Windows. (Fall and spring)

244 **Telecommunications: Technology, Applications, and Operations (3)** Staff

Basic technical concepts, applications, and trends of telecommunications; operations; cost considerations of implementing telecommunications systems.

Prerequisite: MBAd 252. (Spring)

245 **Database Management for Information Systems (3)** Artz

An introduction to the conceptual and logical design of relational databases and techniques for population and exploitation of relational databases. Topics include information modeling, normalized table design, and Structured Query Language.

Prerequisite: MBAd 252. (Fall)

- 248 **Data Warehouse Design (3)** Artz
- Key concepts in data warehouse design, including measurement of business processes, dimensional modeling, theories of data warehouse development, and methods of exploiting the data warehouse. Differences between relational databases and data warehouses. (Spring)
- 271 **Principles of Information Systems (3)** Cherian, Haddad, Money
- Overview of all information systems, including integration of management, information, and systems concepts into a unified framework. Management information systems development, design, implementation, and evaluation strategies. (Fall, spring, and summer)
- 272 **Information Resources Management (3)** Money
- Overview of the strategies, policies, and technology used by organizations to manage information resources and security. Computer networking and national and international telecommunications are examined within the technical, legal, economic, and social environments of systems operations. Prerequisite: M.S.I.S.T. candidacy. (Fall, spring, and summer)
- 273 **Electronic Business (3)** Cherian
- Overview of electronic commerce/electronic business and interorganizational information systems and their impact on contemporary organizations. Technical, business, security, privacy, legal, e-government, and Internet issues. Prerequisite: ISTM 271 or 282 or MBAd 252. (Fall and spring)
- 274 **Survey of Advanced Information Technologies (3)** Lumley

- The processes at work in the emergence of new information technologies and techniques for identifying the impacts of these processes. Strategies of technology planning, project selection, and resource allocation. (Fall, spring, and summer)
- 277 **Human–Computer Interface Design and Evaluation (3)** Granger
- The development of successful human–computer interfaces depends on integrating theory and practice from many different fields. Students gain direct experience in applying an apt mix of concepts and practices in the context of developing, evaluating, and enhancing an Internet application for a real client.
- (Fall, spring, and summer)
- 280 **Information Systems Development and Applications (3)** Dasgupta
- The information systems life cycle is discussed in terms of technologies, impact, and management. Topics include structured and object-oriented analysis, prototyping, software reuse, testing, life-cycle costs, and software development environments.
- Prerequisite: M.S.I.S.T. candidacy or department approval.
- (Fall, spring, and summer)
- 282 **Telecommunication and Enterprise Networks (3)** Staff
- Telecommunications and networking as applied to enterprises in the commercial and public sector. LANs and Internet technologies. Selection of technologies and configurations necessary to support business applications. Prerequisite: M.S.I.S.T. candidacy or department approval. (Fall, spring, and summer)
- 283 **Topics in Higher-Level Languages (3)** Staff
- The structure and organization of high-level languages in relation to the systems development process. Object-oriented design and programming using the JAVA or

- VB.Net programming language. Programming assignments demonstrate the concepts presented. Prerequisite: M.S.I.S.T. candidacy or department approval. (Spring)
- 284 **Database Systems (3)** Artz, Haddad
- In-depth survey of relational database theory and technology. Topics include relational database theory, query languages, database design techniques, normalization, physical design, and transaction models. Prerequisite: M.S.I.S.T. candidacy or department approval. (Fall, spring, and summer)
- 285 **Database and Intelligent Systems (3)** Artz
- Hands-on exposure to relational database technology using a commercial relational database product. SQL extensions for developing triggers and stored procedure and using relational databases in XML applications, database internals, performance, query optimization, indexing options, and recovery. Prerequisite: M.S.I.S.T. candidacy; ISTM 284 or department approval. (Summer)
- 286 **Comparative Operating Systems (3)** Staff
- Survey of modern operating systems including Unix, Windows NT, and MVS. Process management, memory management, storage management, scheduling, and security are considered theoretically and as implemented in specific operating systems. Prerequisite: M.S.I.S.T. candidacy or department approval. (Fall)
- 287 **Design of On-Line Information Systems (3)** Haddad, Money
- Capstone project course. Analysis, design, and implementation of on-line information systems. Systems analysis, database design, dialog design, response time and reliability calculations, system testing, and project planning. Prerequisite: M.S.I.S.T. candidacy or department approval. (Fall, spring, and summer)

- 289 **Web-Based Systems Development (3)** Artz, Lumley
- The conceptualization, design, and development of business applications using the World Wide Web and emerging technologies. Prerequisite: M.S.I.S.T. candidacy or department approval. (Fall and summer)
- 290 **Special Topics (1 to 3)** Staff
- Experimental offering; new course topics and teaching methods. May be repeated once for credit.
- 298 **Directed Readings and Research (3)** Staff
- 299 **Thesis Seminar (3)** Staff
- 300 **Thesis Research (3)** Staff
- 340 **Philosophical Issues in Information Systems (3)** Artz
- Seminar for doctoral students interested in information systems. Various philosophical traditions and insights from those traditions applied to problems in information systems. (Fall, alternate years).
- 341 **Advanced Topics in MIS Research (3)** Prasad, Dasgupta
- For information systems doctoral students. Seminal papers and leading methods and instruments as applied to MIS research. (Spring, alternate years)
- 385 **Special Topics in Research Methods (3)** Wirtz
- Research problems and issues related to student dissertations form topics for readings, group discussions, and assigned papers. (Fall and spring)
- 390 **Philosophical Foundations of Administrative Research (3)** Artz

Philosophy of science as applied to research in administration. Topics include the nature and current problems of epistemology, the development and role of theories, and the relationship between theory, methodology, and empirical data.

(Fall and spring)

391 **Advanced Problems in Research Methodology (3)** Wirtz, Gowan

Use of models and theoretical frameworks in research; formulation of research questions, hypotheses, operational definitions, research designs, sampling and data analysis approaches. For doctoral candidates who have completed the general examination and all courses and are preparing for their dissertation. (Fall and spring)

397 **Doctoral Seminar (1 to 3)** Staff

Current research and scholarly issues in management science.

398 **Advanced Reading and Research (arr.)** Staff

Limited to doctoral candidates preparing for the general examination. May be repeated for credit.

399 **Dissertation Research (arr.)** Staff

Limited to doctoral candidates. May be repeated for credit.

The ISTM courses listed below are offered at the Virginia Campus and are available only to students in the Executive Master of Science in Information Systems Technology.

401 **Individual and Group Decision Processes (3)**

Study of the individual and group processes in decision making in organizations.

Topics include decision effectiveness, decision analysis techniques, group dynamics, and managerial style as related to decision making.

402 **Quantitative Methods for Information Systems (3)**

Introductory study of quantitative techniques for problem solving. Statistical concepts, including confidence intervals, hypothesis testing, correlation, and regression. Linear programming. Applications and case studies involving management information systems.

404 Enterprise Networks in Organizations (3)

The role of data communications and networking within organizations. LANs and interconnecting LANs to create enterprise networks. Emerging technologies such as videoconferencing, multimedia, and ATM. The interaction between networks and MIS as typified by client-server architectures is emphasized.

405 Database Systems (3)

Application and implementation of database management systems in the public and private sectors. Database organization, creation, maintenance, and management. Client-server technology. Review of commercial database management systems.

406 Decision Support Systems and Methods (3)

Computer-based decision-making aids and simulations. Issues in effective implementation of decision support systems. Review and analysis of various expert systems, including tools and generators, classification vs. diagnostic type systems, and building modules. Design of decision support and expert systems.

407 Introduction to MIS Business Relationships (3)

Introduction to MIS business solutions. Integration of MIS into the business and organizational environment. Case studies of various organizational structures and MIS needs and solutions. Economic analysis of MIS applications.

408 Strategic Planning and Business Process Engineering (2)

Development and implementation of a long-range organizational strategy. Business process engineering and re-engineering. Technology assessment and technical management, use of critical success factors. Innovative uses of MIS in organizations.

410 Information Systems Security (2)

Network and MIS security issues. Risk assessment, technological and procedural security measures. Computer fraud and privacy issues. Hacker attacks, phone fraud, denial of service, and virus and worm attacks.

411 Information Systems Design (4)

Introduction to the design and analysis of information systems. The systems development life cycle, analysis of requirements, design of logical systems, analysis and design of user interfaces, system documentation and specifications. Planning for system implementation, evaluation, and maintenance.

412 The Information System Development Process (2)

Management decisions and activities during the life cycle of an information system. Project estimation and planning for information systems. Contractual issues in system development and acquisition. Requirements analysis, systems analysis, development, testing, and maintenance. Rapid prototyping, spiral model development, and alternative development strategies.

490 Special Topics (1 to 3)

INTERIOR DESIGN

Assistant Professors E. Speck, N. Evans

Master of Fine Arts in the field of interior design—Prerequisite: A bachelor's degree in a field other than interior design, including a minimum of 6 credit hours each in fine arts and art

history. A portfolio consisting of examples of relevant work, including the fine arts prerequisites, is to be submitted with the application to the program.

Required: The general requirements stated under the Columbian College of Arts and Sciences and 45 credit hours of course work, including IntD 201, 202, 203, 210, 211, 212, 213, 230, 231, 233, 290, 291 and 9 credits of electives chosen in consultation with the graduate program advisor.

Note: A course fee is charged for all interior design courses except IntD 233, 272, and 290.

201 Foundations in Interior Design Theory (3)

Theory and topics in design. Application of design principles and elements to specific studies of the built environment. Examination of relationships among creative, social, and technical dimensions of interior design. (Fall)

202 Drafting and Graphics (3)

Basic graphic communication skills appropriate for the development of design projects and study exercises. Two- and three-dimensional drawing skills developed through sketching, orthographic drawing, paraline drawing, and pictorial perspective. Use of equipment and material required for technical drawing. (Fall and spring)

203 Textiles and Finish Materials (3)

All phases of textile production, including standards, testing, and specifications. Properties, regulations, and installation of interior finish materials. (Spring)

210 Graduate Studio I: Residential (3)

Application of basic design concepts and processes to residential design. Human factors and development of space planning skills in single and multifamily spaces. Selection of furniture, fabric, and finishes. Design of custom millwork and window

treatments. Introduction to research and documentation. Prerequisite: IntD 201, 202, and 203. (Spring)

211 Graduate Studio II: Commercial (3)

Nonresidential spaces: commercial and hospitality. Intensive analysis and space planning of nonresidential interiors with emphasis on technology, codes, and environment and behavior concepts. Prerequisite: IntD 210. (Fall)

212 Graduate Studio III: Institutional (3)

Multifaceted and complex problems in healthcare and institutional design. Further exploration of design theory, practical application and guidelines, and development of advanced studio work. Prerequisite: IntD 211, 230, and 231. (Spring)

213 Advanced Drafting and Materials (3)

Structural building systems, methods and materials of construction, and standard graphic representation. Organization and preparation of construction documents, finish and materials, and interior component schedules and detailing. Prerequisite: IntD 211. (Spring)

230 Computer-Aided Drafting (3)

Introduction to CAD technology, two-dimensional drawings, plotting and enhancement of presentations. Use of CAD for the production of construction drawings. Prerequisite: IntD 202 and permission of instructor. (Fall and spring)

231 Lighting Design (3)

Terminology, concepts, and principles of lighting design. Light and energy, incandescent and gaseous discharge lamps, luminaries, task requirements,

measurement and calculations, human factors, and design applications. Case studies highlighting successful lighting design installations. Prerequisite: IntD 210. (Fall)

233 Practicum (3)

Students work with professional interior designers or architects or industry-related professionals, participating in a project-based setting. Roles and responsibilities of the professional interior designer: business procedures, legal implications, ethics, trade relations, designer-client-contractor relations. Prerequisite: IntD 211 and permission of instructor. (Spring and summer)

235 Color Theory (3)

Intensive exploration of the objective rationale and subjective experience of color in interiors through execution of problems in color contrast and color scales.

250 Studio in Historic Interiors (3)

Exploration and interpretation of significant periods of interior design through the study of historic furniture, decorative arts, and architecture. Application of historic styles for restoration or adaptive use. Prerequisite: IntD 201, 202. (Fall)

251 Furniture Design (3)

Major 20th-century furniture designers and the environments in which their furniture was used. Study and design of furniture that combines functional and aesthetic quality. Use of two- and three-dimensional drawings and models to develop design and technical skills. Prerequisite: IntD 201, 202. (Fall)

252 Presentation Techniques (3)

Development of multimedia techniques in rendering. Advanced three-dimensional drawing using rapid visualization techniques, sketching, and constructed drawings.

Prerequisite: IntD 201, 202. (Spring)

253 Advanced Computer-Aided Drafting (3)

Three-dimensional modeling applications used to examine form and space in a practical in-depth exploration. Application of advanced computer graphics to a studio project. Prerequisite: IntD 230. (Spring)

255 New Materials and Concepts (3)

New materials and technologies that are being introduced in built interior environments. Focus on product development, adaptive design, and alternative design theories and methodologies. (Spring)

270 Special Topics (3)

A theoretical and practical in-depth exploration of a specific area of interior design. Topic to be announced in the Schedule of Classes. Prerequisite: permission of instructor.

271 Environmental Analysis (3)

Evaluation of interior spaces for effectiveness and coherence. The effect of the built environment on human behavior. Factors that contribute to functional and dysfunctional design for interiors. Prerequisite: IntD 201. (Spring)

272 Individual Problems and Research (arr.)

Independent research on selected topic. Research proposal must be approved by faculty prior to registration. May be repeated for credit with permission.

273 Contemporary Issues in Interior Design (3)

Aspects of design that affect the profession and practice of interior design. Topics include code analysis, workplace strategies, programming demographics/strategies, product development, integrated security design, acoustic issues, and sustainable design. (Fall)

290 Research Seminar (3)

Application of advanced topics in design theory; research methodology applied to development of the graduate project. Prerequisite: IntD 213. (Summer)

291 Graduate Project (3)

Capstone studio. Application of design skills and knowledge, individual development of the design process, problem-solving skills, and evaluation and defense of the project. Prerequisite: IntD 290. (Fall)

INTERNATIONAL AFFAIRS

University Professors L.A. Etzioni, H. Harding, J.N. Rosenau, B. Wood

Professors H.L. Agnew, C.J. Allen, H.G. Askari, M.A. Atkin, W.H. Becker, E. Berkowitz, A.

Black (*Research*), B.L. Boulier, M.D. Bradley, A. Brooks, M.E. Brown, N.J. Brown, J.

Chaves, J.J. Cordes, W.K. Cummings, H.J. Davis, C.J. Deering, B.J. Dickson, R.M. Dunn, Jr.,

R.M. Entman, H.B. Feigenbaum, J. Ferrer (*Research*), M. Finnemore, L. Fuerth (*Research*),

E.W. Gnehm, J. Goldgeier, D. Gow (*Practice*), T. Griffith (*Practice*), R. Grinker, H. Hertzfeld

(*Research*), P. Hotez, K.F. Inderfurth (*Practice*), G. Kaminsky, D.K. Kennedy, R.E. Kennedy,

Jr., Y.K. Kim-Renaud, P.F. Klarén, C. Kojm (*Practice*), J. Kuipers, M. Marquardt, C.

McClintock, B.D. Miller, M.O. Moore, H.R. Nau, S. Pace (*Practice*), J. Pelzman, J.M. Post, S.

Rehman, B. Reich, W. Reich, L.P. Ribuffo, F. Robles, R.W. Rycroft, S. Sell, D. Shambaugh,

GW Graduate Bulletin 2009

S.C. Smith, M. Sodaro, R.H. Spector, R. Steinhardt, R. Thornton, N.S. Vonortas, R. Weiner, S. Wolchik, H.L. Wolman, A.M. Yezer

Associate Professors S. Aday, S. Balla, J. Blomster, N. Blyden, A. Bowie, J. Brinkerhoff, Y.

Captain, E. Chacko, R.W. Click, M. Gonglewski, D.A. Grier, H.E. Hale, S. Hamano, H.M.

Harrison, J. Hershberg, D. Khoury, J.H. Lebovic, D.L. Lee, S. Livingston, M. Lynch, M.

McAlister, E.A. McCord, S. McHale, M.M. Mochizuki, K. Morgan, M. Price, L.A. Riddle, S.

Roberts (*Practice*), R. Robin, P. Rollberg, J. Spear, J. Spencer, M.B. Stein, S. Suranovic, J.H.

Williams, P.D. Williams, D. Yang, J. Yang, A. Zimmerman

Assistant Professors M. Atia, M. Ayyagari, G. Brazinsky, M.X. Chen, M. Cipriani, A.S. Dent,

D.S. Eglitis, M.S. Emran, M. Esseesy, H.J. Farrell, I. Feldman, A. Fostel, A. Friedman, L.

Fujii, I.L. Hanami, J.K. Jung, P. Kelly, G.M.S. Lambright, S. Lubkemann, R. Lucea, T.

Michael, D.R. Rain, C. Rector, S. Robinson, R.M. Samaniego, R.J. Shepherd, T. Sinclair, E.J.

Teitelbaum, P.N. Zhang

Instructor H. Schmidt

Adjunct Professor I. Sud

Professorial Lecturers G. Fidas, K. Healy, S. Johnson, J. Kilpatrick, T. McNamara, G. Moose,

B. Powers, B. Roberts, D. Shinn, R. Sutter, W. Wise, J. Yaphe

See the Elliott School of International Affairs for programs of study leading to the Master of Arts in the fields of Asian studies, European and Eurasian studies, global communication, international affairs, international development studies, international science and technology studies, international trade and investment policy, Latin American and hemispheric studies, Middle East studies, and security policy studies. The Master of International Policy and Practice and the Master of International Studies are offered as well.

202–3 **Professional Skills** (1 each)

Short courses that focus on developing specialized skills for international affairs professionals. Topics announced in the Schedule of Classes.

204 **Intermediate Conversation** (1)

Short courses designed to develop professional language skills for international affairs students. Specific languages announced in the Schedule of Classes.

206 **Secretaries of State** (3)

The various roles performed by modern secretaries of state, focusing on their practice of international affairs—how they pursued their various responsibilities and how successful they were in carrying them out.

207 **Theory and Practice of International Negotiations** (3)

The organizational context of international negotiations; roles of negotiators; presentation and negotiation strategies; the interagency process.

212 **Applied Quantitative Analysis** (3)

Overview of quantitative measurement, data summary, statistical inference, and elementary modeling such as linear regression.

218 **Special Topics in International Affairs** (0 to 3)

Topics announced in the Schedule of Classes.

219 **International Affairs Capstone** (1 or 3)

A project-oriented course designed to synthesize the skills and knowledge that students have acquired in their graduate study. Open only to M.A. candidates in international affairs.

221 **International Development Studies Cornerstone** (3)

Introduction to the concepts and methods of international development. Open only to M.A. candidates in international development studies.

222 Development Policy and Practice (3)

An overview of economic development in developing countries; key challenges of economic growth, poverty alleviation, and development.

224 Indigenous Social Movements (3)

Indigenous movements that challenge Western social models. Comparative and historical frameworks are used to examine the political empowerment of indigenous peoples.

226 NGOs and Development (3)

A critique of the work of non-governmental organizations with reference to urbanization, rural development, and trends in international development planning. NGO–state relations; international NGOs and grassroots organizations.

227 Qualitative Research Methods in International Development (3)

Skills and knowledge for conducting original research and critically evaluating observational studies. Statistical tests of hypotheses, computerizing data sets for quantitative analysis, and analyzing strength of relationships.

232 U.S. Aid and Trade in the Developing World (3)

Survey of American aid and trade policies toward developing countries. Activities of USAID, the new Millennium Challenge Account, and the policies of the United States toward the multilateral development banks.

233 Assessing Aid Effectiveness (3)

The economic, political, and institutional impacts of official developmental aid; the track record, recent initiatives to improve aid impacts, and future prospects.

235 Development Studies Pre-Capstone Workshop (1)

Students work in teams to find a suitable client and negotiate a project, with detailed terms of reference and a work plan to be carried out in the spring semester. Open only to M.A. candidates in international development studies.

238 Special Topics in International Development Studies (0 to 3)

Topics announced in the Schedule of Classes.

239 International Development Studies Capstone (3)

A project-oriented development course abroad, designed to synthesize the skills and knowledge that students have acquired in their graduate study. Open only to M.A. candidates in international development studies.

241 International Science and Technology Policy Cornerstone (3)

Introduction to the study of international science and technology policy; focus on policy issues that arise from interactions between scientific and technological developments and government activity.

242 Technology Creation/Diffusion (3)

Examination of the relationship between invention (inception), innovation (first application), and dissemination (diffusion) of technological knowledge; focus on the technological environment prevailing in the major developed market economies.

246 U.S. Space Policy (3)

The origins, evolution, current status, and future prospects of U.S. national space policy and the space programs of the U.S. government in international context.

248 Issues in U.S. Space Policy (3)

In-depth analysis of a current space policy issue. Team research format involving preparation of a comprehensive assessment of the issue and policy recommendations regarding its resolution. May be repeated for credit provided the topic differs.

252 Environmental Policy (3)

Examination of public policies designed to protect the human and physical environment; focus on the ways science and technology can simultaneously create new environmental problems and contribute to their mitigation and prevention.

253 Science, Technology, and National Security (3)

The contributions of science and technology to U.S. security in military, intelligence, and homeland security activities.

255 Science Policy (3)

The fundamental forces and issues behind the governance of scientific research. How scientists attempt to maintain their autonomy by controlling membership in their community, by restricting the problems they investigate and methods they use, and by having at least moral suasion over resources allocated to scientific research.

258 Special Topics in International Science and Technology Policy (0 to 3)

Topics announced in the Schedule of Classes.

259 Science and Technology Policy Capstone (3)

A seminar designed to synthesize the skills and knowledge that students have acquired in their graduate study. Open only to M.A. candidates in science and technology policy.

264 Defense Policy and Program Analysis I (3)

Examination of how national security policy is formulated and translated into a defense budget, program priorities, and force structure. Focus on nuclear forces.

265 Defense Policy and Program Analysis II (3)

Analysis of the development of national security policy and analytic techniques to derive a defense program and force structure from it. Special attention to general-purpose forces.

266 Defense Transformation (3)

The post-9/11 security environment in the midst of the information revolution, economic globalization, fragmentation of the state system, and the ongoing war on terrorism. Efforts underway to understand and master this new environment and impacts of these efforts.

267 National Security Resources (3)

National security resource planning and the federal budget-making process in relation to international affairs and defense.

268 Fundamentals of Intelligence (3)

The institutional structure of the intelligence community; the intelligence production cycle, including tasking, collection, analysis, covert action, and counterintelligence; and relations between the intelligence and policy communities.

269 Advanced Studies in Intelligence (3)

Organizational and operations practices of U.S. and foreign intelligence, using a case study approach. Challenges facing the intelligence community today.

270 Covert Action and National Security (3)

The nature and principles of covert action: how it is employed to achieve foreign policy objectives and its capabilities and limitations.

271 **Transnational Security (3)**

Overview of security concerns that transcend state borders, including terrorism, drug trafficking, organized crime, weapons proliferation, migration, and environmental degradation.

272 **Terrorism and U.S. Foreign Policy (3)**

Development of a model for understanding the ideologies, tactics, targets, and worldviews of terrorists groups, with U.S. policy options for counterterrorism efforts.

273 **Responses to Terrorism (3)**

The institutions, methods, and motivations that underlie counterterrorism strategies of threatened nations and international organizations.

274 **Weapons Proliferation and Nonproliferation (3)**

The changing nature of the weapons proliferation problem, its implications for national security and international stability, and policy responses toward nonproliferation and counterproliferation. Implications of the acquisition of chemical, biological, and nuclear weapons by non-state actors.

275 **Homeland Security (3)**

The central missions of a homeland security agency: domestic security, emergency preparedness, technology policy, timely intelligence, counterintelligence, and preemptive actions. How the U.S. has dealt historically with internal security matters; contemporary approaches to security problems.

280 **International Organized Crime (3)**

The initiation, structure, and expansion of organized criminal activity that crosses political and cultural boundaries. The policies, political actions, legal steps, and policing strategies that have been deployed against international organized crime.

282 Issues in Conflict Resolution (3)

A study of the issues relating to international conflict management, such as mediation, conflict prevention, implementation of peace agreements, peace enforcement, humanitarian intervention, and refugee management.

283 Military and Post-Conflict Intervention (3)

The challenges posed by conflicts, in the context of both conflict termination and subsequent stabilization efforts needed to prepare and support conflict resolution.

286 Insurgency and Counterinsurgency (3)

Causes and types of insurgencies, with methods and strategies for countering insurgencies. The roles of U.S. government agencies and the military in counterinsurgency efforts.

288 Special Topics in Security Policy Studies (0 to 3)

Topics announced in the Schedule of Classes.

289 Security Policy Studies Capstone (3)

A project-oriented course, designed to synthesize the skills and knowledge that students have acquired in their graduate study. Open only to M.A. candidates in security policy studies.

290 Elliott School Seminars (0 to 3)

Topics announced in the Schedule of Classes.

296 Graduate Internship in International Affairs (0)

Limited to Elliott School M.A. degree candidates. Internship and research paper involving experience at an international organization or with international issues.

297 Independent Study and Research (1 to 3)

Limited to Elliott School M.A. degree candidates. Written permission of instructor required.

299–300 Thesis Research (3–3)

Open to Elliott School M.A. candidates who have selected the thesis option.

308 Special Topics in International Trade and Investment Policy (0 to 3)

Topics announced in the Schedule of Classes.

309 International Trade and Investment Policy Capstone (1)

A project-oriented course, designed to synthesize the skills and knowledge that students have acquired in their graduate study. Open only to M.A. candidates in international trade and investment policy.

311 European and Eurasian Studies Cornerstone (3)

Survey of current research on Europe and Eurasia. Research paper required. Required of M.A. candidates in European and Eurasian studies; open to others with permission of the instructor.

312 NATO and European Security (3)

NATO's origins and evolution during the Cold War (1945–1990) and the transformation since its end; changes in the post–Cold War security environment in Europe.

318 Special Topics in European and Eurasian Studies (0 to 3)

Topics announced in the Schedule of Classes.

319 European and Eurasian Studies Capstone (3)

A project-oriented course, designed to synthesize the skills and knowledge that students have acquired in their graduate study. Open only to M.A. candidates in European and Eurasian studies.

322 Taiwan: Internal Development and Foreign Policy (3)

The social, political, and economic development in Taiwan since World War II; Taiwan's foreign affairs.

323 Asian Regional Security (3)

The nature, elements, and future of security in the Asia–Pacific region. Various analytical frameworks are examined to consider the interplay of national interests, ideology, and regionalism. Issues in regional security.

325 U.S.–South Asia Relations (3)

The nature of challenges and opportunities facing the South Asia region and the U.S. policy response. The rise of India as a global actor; relations between India and Pakistan; political transformation in the countries of the region, including Nepal and Sri Lanka.

328 Special Topics in Asian Studies (0 to 3)

Topics announced in Schedule of Classes.

329 Asian Studies Capstone (1)

A project-oriented course, designed to synthesize the skills and knowledge that students have acquired in their graduate study. Open only to M.A. candidates in Asian studies.

331 Latin American and Hemispheric Studies Cornerstone (3)

Multidisciplinary foundation course for the Latin American and hemispheric studies program.

332 Drug Trafficking in the Americas (3)

A historical, comparative, and contemporary picture of drug trafficking in the Americas and the anti-narcotics policies to combat this trade.

337 Pre-Capstone Workshop (1)

338 Special Topics in Latin American and Hemispheric Studies (0 to 3)

Topics announced in the Schedule of Classes.

339 Latin American and Hemispheric Studies Capstone (3)

A project-oriented course, designed to apply the skills and synthesize the knowledge that students have acquired in their graduate study. Open only to M.A. candidates in Latin American and hemispheric studies.

341 Middle East Studies Cornerstone (1)

Multidisciplinary foundation course for the Middle East studies program. Introduction to key issues.

342 Regional Security in the Middle East (3)

The nature, elements, and future of security in the Middle East region. Various analytical frameworks are examined to consider the interplay of national interests, ideology, and regionalism. Issues in regional security.

345 Economic and Social Development of the Middle East (3)

Comparative overview of economic and social systems in the Middle East.

346 Political Economy of the Middle East (3)

- Current political economy of the Middle East, including an overview of Islamic economic concepts and political organizations.
- 347 **Religion and Society in the Modern Middle East (3)**
- Comparative overview, both historical and current, of religious and social trends in the Middle East.
- 358 **Special Topics in Middle East Studies (0 to 3)**
- Topics announced in the Schedule of Classes.
- 359 **Middle East Studies Capstone (3)**
- A project-oriented course, designed to synthesize the skills and knowledge that students have acquired in their graduate study. Open only to M.A. candidates in Middle East studies.
- 371 **U.S. Foreign Policy Institute (3 or 4)**
- The institutions and ideas that shape U.S. foreign policy, including the U.S. Congress and administration, foreign embassies, international organizations, think tanks, interest groups, and media outlets. A separate section of the course covers issues of reporting on foreign policy issues.
- 379 **Global Communication Capstone (3)**
- A project-oriented course, designed to synthesize the skills and knowledge that students have acquired in their graduate study. Open only to M.A. candidates in global communication.
- 381 **MIPP Practicum (3)**
- For Master of International Policy and Practice degree candidates only.
- 770 **Turbulence in World Politics (3)** Rosenau

See the University Professors course listing.

772 **The Dynamics of Globalization (3)**

Rosenau

See the University Professors course listing.

INTERNATIONAL BUSINESS

Professors Y.S. Park, H.G. Askari, F. Robles, R. Weiner, J. Yang, S.S. Rehman

Associate Professors R.W. Click (*Chair*), J. Ferrer (*Research*), J.W. Spencer, J. Forrer

(*Research*), L.A. Riddle, A. Phene

Assistant Professors P. Dastidar, M. Ayyagari, R. Lucea

Instructor S. Jandhyala

See the School of Business for programs of study in business administration leading to the degrees of Master of Business Administration and Doctor of Philosophy.

Departmental prerequisite: MBAd 240 or Econ 283 or 284 is prerequisite to all courses in the International Business Department. Additional prerequisites appear with some IBus courses below.

260 **Global Competitive Frameworks (3)**

Rehman

How industries develop sustained competitive advantages within the global framework. The European Union's "single market" and the Economic–Monetary Union; the transformation of formerly centrally planned economies; the changing Japanese economy and emerging Pacific Basin, with implications for the U.S. economy, industries, and firms.

263 **Legal Aspects of International and Multinational Business (3)**

Staff

Legal environment of international and multinational business including legal systems, antitrust laws, regulation of direct investment, international arbitration and expropriation; topics of current interest.

264 **International Business Strategy (3)** Click, Spencer, Phene

Discussion of the changing nature of the international environment and the resulting impact on strategy of both U.S. and foreign multinational corporations. Various aspects of strategy are considered, including marketing, production, and financial strategy. The focus of discussion is at the company level.

266 **International Marketing (3)** Robles, Riddle

International marketing strategy formulation, including market entry, local market development, and global market integration. The strategic challenge of global marketing formulation and local market adaptation, with attention to market conditions in mature, new growth, and emerging market environments. Emerging trends in international marketing.

267 **Regional International Marketing Systems (3)** Robles

The business, economic, investment, and market environments in the world's most dynamic emerging regions of Asia and Latin America. Nature and impact of economic reforms, direct investment patterns, regional integration, and competitiveness in regional markets. Formulation of regional strategies for multinationals from within and outside the regions.

268 **International Marketing Practicum (3)** Robles

Field experience in developing international marketing strategy formulation. Small groups of students develop recommendations for international market entry strategies in a practical setting. Prerequisite: permission of instructor.

269 **Managing in Developing Countries (3)** Riddle

The course introduces managers to the distinctive nature and challenges of developing countries, provides a framework to analyze key management issues, and applies management techniques in these important markets.

271 **International Business Finance (3)** Park, Rehman, Weiner,
Yang, Askari, Click

Analysis of major issues and developments in the international financial environment and their impact on multinational corporations and financial institutions. Prerequisite: MBAd 250.

272 **Currency and Banking Crises in Emerging Markets (3)** Staff

Public policy issues surrounding financial crises in emerging market economies.

Comparison of the economic reasons for the crises as well as the responses of various governments and international financial institutions.

273 **Seminar: International Banking (3)** Park, Yang

Evolution in international banking and other international financial institutions.

Functioning of international banking operations, public policy issues and regulatory issues in international banking, and the effect of international banks on national monetary policies.

274 **Global Investment Banking (3)** Staff

Examination of investment banking as practiced in a global context from a strategic perspective using case studies and readings. Topics covered include securities underwriting and derivatives instruments, risk management, and business development strategies.

275 External Development Financing (3) Staff

Institutions, instruments, and theory of external development financing; financial flows to developing countries; development finance and the role of international and regional development banks; policies, methods, and practices of the World Bank, the IMF, and others; technical assistance, training, capacity building, and role of institutions in sustained development.

276 Seminar: International Financial Markets (3) Park, Askari, Weiner

Survey of international financial markets, focusing on structure, operations, and pricing. Primary emphasis on markets for foreign exchange, Eurocurrency, international bonds, and commodities. Derivatives markets, especially swaps and options embedded in international securities issues. Prerequisite: IBus 271.

277 International Portfolio Management (3) Weiner

Theory and practice of international investment. Portfolio construction and optimization. Effects of exchange rate changes on portfolio risk and return. International asset pricing models and trading institutions. Prerequisite: MBAd 250; either MBAd 240 or Econ 284.

278 International Business Negotiations (3) Staff

Theories and application in International Business Negotiations (IBN). Formulation of concepts and frameworks; development of systematic approaches to planning for

and conducting IBN. Integration of functional, environmental, and institutional contexts facing negotiators internationally.

290 **Special Topics (1 to 3)** Staff

Experimental offering; new course topics and teaching methods. May be repeated once for credit.

292 **Global Human Resource Management (3)** Staff

Same as Mgt 252.

297 **International Management Experience (3)** Staff

Same as Accy/Fina/Mgt/Mktg/SMPP 297. May be repeated for credit.

298 **Directed Readings and Research (3)** Staff

Supervised readings or research in selected fields within business administration.

Admission by prior permission of instructor. May be repeated once for credit.

299 **Thesis Seminar (3)** Staff

300 **Thesis Research (3)** Staff

311 **Seminar: Public–Private Sector** Staff

Institutions and Relationships (3)

Same as SMPP 311.

361 **Colloquium on International Business (3)** Staff

Examination of selected topics in international business, with emphasis on major new theoretical and empirical developments.

397 **Doctoral Seminar (1 to 3)** Staff

398 **Advanced Reading and Research (arr.)** Staff

Limited to doctoral candidates preparing for the general examination. May be repeated for credit.

399 Dissertation Research (arr.)

Staff

Limited to doctoral candidates. May be repeated for credit.

MANAGEMENT

Professors S.A. Umpleby, E.K. Winslow, J. Bailey (*Chair*), P.M. Swiercz

Associate Professors P. McHugh, G.T. Solomon, D.C. Kayes

Assistant Professors T.M. Nielsen, J.M. Jensen, J.C. Messersmith, S.N. Hill

See the School of Business for programs of study in business administration leading to the degrees of Master of Business Administration and Doctor of Philosophy.

203 System Dynamics Modeling (3)

Umpleby

Computer modeling of organizational problems using system dynamics and the dynamo programming language. Review of previous applications of system dynamics and comparison with other modeling approaches. Causal influence diagrams, level and rate diagrams, equations, testing, and analysis. Students develop a system dynamics model of some aspect of the organization. (Fall)

210 Individual and Group Dynamics in Organizations (3)

Kayes, Bailey

Theoretical, empirical, and practical aspects of individual and group dynamics in organizations. Personal, interpersonal, and cultural aspects of teams and groups. Team structure, process; the role of individual experience and its impact on team learning. (Fall, spring, and summer)

213 Change Management (3)

Kayes, Nielsen

Behavioral and organizational components of individual, team, and firm-wide change.

The dynamics that often accompany the change process. (Fall)

214 **Consultative Processes (3)** Winslow, Nielsen

Theories and methods of planning, introducing, and coping with change in management through the helping process. Intended both for managers seeking an understanding of the consultative approach to planned change and for persons in staff or consultative roles seeking understanding of the consultative process. (Spring)

215 **Conflict Management and Negotiations (3)** Bailey, McHugh

The nature and sources of conflict and interdependence in social and organizational dynamics. Various means of resolving conflict, including the use of competitive and collaborative negotiations and mediation. Case discussion, exercises, role-playing, and simulation. Managers as mediators and negotiators. (Fall and spring)

216 **Cross-Cultural Management (3)** Umpleby, Bailey

The cultural foundations of organizations and institutions, with an emphasis on managerial behavior. Cross-cultural differences as they affect work-related behaviors, such as communication, attitude, teamwork, negotiation, and decision making. (Fall, spring, and summer)

251 **Total Compensation (3)** Jensen

Comprehensive review of all elements of compensation systems that affect an organization, including wages and salaries, incentives, benefits, perquisites, and intrinsic rewards. (Fall)

252 **Global Human Resource Management (3)** McHugh

- International applications of human resource management functions. Selection, preparation, and compensation of U.S. managers and executives for service abroad. Adaptation of human resource management policies to conform to specific cultural environments. (Fall and summer)
- 253 **Leadership and Executive Development** (3) Swiercz, Winslow
Theories of managerial leadership; issues and problems associated with leadership in large organizations at higher management levels: executive selection and development. (Fall)
- 254 **Negotiations and Labor Relations** (3) McHugh, Swiercz
Negotiation theory and practice in the context of labor–management relations in both union and nonunion settings. Emphasis on negotiation and conflict resolution skills, arbitration and grievance procedures, public-sector labor relations, labor laws and public policy, and global labor relations issues. (Spring)
- 257 **Performance Management and Development** (3) Jensen
Comprehensive review of performance appraisal and training and development. Students learn to develop customized training programs that relate to the performance appraisal process. (Spring)
- 258 **Applied Organizational Leadership** (3) Swiercz, Bailey
In-depth studies of theories of leadership. Legal and ethical obligations of leadership. The leader in the process of assuming responsibility. Experiential exercises designed to develop the students' interpersonal abilities and leadership capacities. (Spring)
- 259 **Employment Law and Ethics** (3) Swiercz, McHugh

- An examination of the interaction of legal requirements and personal ethics and their influence on managerial decisions affecting the employment exchange. Special emphasis on equal employment opportunity and civil rights, workers' compensation, occupational health and safety, collective bargaining, and wrongful discharge. (Fall)
- 290 **Special Topics** (1 to 3) Staff
Experimental offering; new course topics and teaching methods. May be repeated once for credit.
- 291 **Entrepreneurship** (3) Solomon
In exploring the "entrepreneur as a phenomenon," students will be exposed to the theory and experiences associated with entrepreneurs, entrepreneurial acts, and entrepreneurship in all organizational settings—large, small, public, and private.
(Fall and spring)
- 292 **Small-Business Management** (3) Solomon
The start-up process and management of small firms. Field projects involve student teams as consultants to local businesses. Case studies. Emphasis on total customer service, international opportunities, and minority and women's issues.
- 293 **New Venture Initiation** (3) Solomon
Essentials of planning a new business venture, sources of financing, evaluation of alternative new business ventures, and analysis of business functions. Creating and analyzing the business plan.
- 294 **Strategic Entrepreneurship** (3) Solomon
Capstone course for the small business/entrepreneurship concentration. Student teams assist companies in upgrading strategies.

- 295 **Family Business Strategies (3)** Solomon
- Challenges of managing a family business: risk strategies; successor development and succession planning; stages of family business growth; family motivations and goals.
- Field projects provide hands-on experience.
- 297 **International Management Experience (3)** Staff
- Same as Accy/Fina/IBus/Mktg/SMPP 297. May be repeated for credit.
- 298 **Directed Readings and Research (3)** Staff
- 299 **Thesis Seminar (3)** Staff
- 300 **Thesis Research (3)** Staff
- 382 **Foundations of Organizational Behavior and Development (3)** Kayes, Nielsen
- The individuals and institutions central to the field of organizational behavior and development. Students read about, meet with, and discuss the work of persons central to the development of the field. Prerequisite: Doctoral candidate status with organizational behavior and development as a major or supporting field, or consent of instructor. (Spring, alternate years)
- 383 **Field Research in Organizational Settings (3)** Staff
- Applications of field research techniques in formal organizational settings.
- Examination of the logic of inquiry and techniques of qualitative data collection.
- Intensive interviewing and participant observation in field settings are emphasized.
- (Fall)
- 385 **Special Topics in Research Methods (3)** Staff
- Research problems and issues related to student dissertations form topics for readings, group discussions, and assigned papers. (Fall and spring)

- 386 **Management Ideas in Progress (3)** Bailey, Winslow, Swiercz
- Doctoral students work with a variety of faculty members as they develop new ideas, research projects, and engage in seminal inquiry. The content and structure of the course will depend upon the instructor. Prerequisite: Doctoral candidate status with organizational behavior and development as a major or supporting field, or consent of instructor.
- 390 **Philosophical Foundations of Administrative Research (3)** Staff
- Philosophy of science as applied to research in administration. Topics include the nature and current problems of epistemology, the development and role of theories, and the relationship between theory, methodology, and empirical data.
- (Fall and spring)
- 391 **Advanced Problems in Research Methodology (3)** Staff
- Use of models and theoretical frameworks in research; formulation of research questions, hypotheses, operational definitions, research designs, sampling and data analysis approaches. For doctoral candidates who have completed the general examination and all courses and are preparing for their dissertation. (Fall and spring)
- 397 **Doctoral Seminar (1 to 3)** Staff
- Current research and scholarly issues in management science.
- 398 **Advanced Reading and Research (arr.)** Staff
- Limited to doctoral candidates preparing for the general examination. May be repeated for credit.
- 399 **Dissertation Research (arr.)** Staff
- Limited to doctoral candidates. May be repeated for credit.

MARKETING

Professors R.F. Dyer, P.A. Rau, R.S. Achrol, L.M. Maddox, S.S. Hassan (*Chair*)

Associate Professors M.L. Liebrezn-Himes, V. Perry

Assistant Professors A.V. Krasnikov, K.R. Schueler

See the School of Business for programs of study in business administration leading to the degrees of Master of Business Administration and Doctor of Philosophy.

Departmental prerequisite: MBAd 230 is prerequisite to all courses in the Marketing Department.

241 **Advanced Marketing Management (3)** Rau, Hassan

For M.B.A. students in concentrations other than marketing. Case analysis of marketing problems. Current developments in marketing practice. The relationship of marketing to environmental forces and other business functions. (Spring)

242 **Buyer Behavior (3)** Hassan, Maddox

The buyer decision process model as a framework for analysis of how and why products and services are purchased and used. The impact of consumer decisions on the marketing strategies of organizations. Marketing applications in high-tech and service industries. (Fall)

243 **Marketing Research (3)** Dyer, Rau

The marketing research process: designing, conducting, and using market research studies. Managing the market research project; qualitative research; survey and experimental designs; data analysis with statistical software packages. Prerequisite: MBAd 220 and 221. (Fall and summer)

246 **Marketing of Services (3)** Liebrezn-Himes

- Management of the activities involved in marketing new and existing services. The innovation system (behavioral and organizational) of service product decisions, product planning processes, marketing auditing, services and the law, and new service trends. Marketing of intangibles and services is highlighted. (Spring)
- 248 **Advertising and Sales Promotion (3)** Maddox
- Examination of advertising and sales promotion from a systems perspective supported by analytical methods and concepts regarding consumer attitudes and behavior. The role of communication in marketing, behavioral research, message design, economic and financial criteria, development of a promotion program. (Spring)
- 250 **Selling and Sales Management (3)** Divita
- The selling task, with attention to ethical and legal issues, the selling process, nonverbal language, account management, proposal writing, negotiation. Managerial issues, demand analysis and resource allocation, motivation, coaching and incentives, sales administration, and analysis of sales performance. (Fall and spring)
- 251 **Product Management (3)** Rau
- Examination of all the stages of a product's life, from idea generation through screening, development, and commercialization. Emphasis on new product development. (Spring)
- 252 **Electronic Marketing and Commerce (3)** Dyer
- The impact of technology on sales and marketing strategy. Areas explored include e-branding, customer relationship management, permission e-mail, sales force technology enhancement, mobile commerce, online marketing research, and electronic channels of distributions. (Spring)

- 253 **Marketing Channels of Distribution (3)** Achrol
- Designing and managing channels of distribution. Retailing and wholesaling strategy. Electronic marketing channels: e-Business models and execution. Design of integrated inventory, physical distribution, and logistics systems. Managing channel relations and measuring performance. Regulatory issues in conventional and electronic channels. Global networks. (Fall)
- 255 **Marketing High Technology (3)** Divita
- Emphasis on differentiating the marketing process used for marketing high technology and high technology products from that employed by firms offering a standard product line. Market analysis, product planning, channels of distribution, pricing, promotion, decision making, and developing an integrated marketing plan. Primarily for M.S.I.S.T. students.
- 257 **Marketing and Public Policy (3)** Divita
- Examination of principal areas of public policy formulation affecting marketing practice. Topics: advertising, warranties, product safety, health issues, consumer information systems, informal and formal redress mechanisms, business responsibilities. Government, business, and advocate viewpoints presented.
- 259 **Marketing Strategy (3)** Divita, Rau
- Required capstone course for marketing students. Analysis of complex marketing problems involving policy and operational decisions; emphasis on creative marketing strategy. Prerequisite: completion of at least three Second-Level marketing courses, excluding Mktg 241. (Spring)
- 290 **Special Topics (1 to 3)** Staff

- Experimental offering; new course topics and teaching methods. May be repeated once for credit.
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| 297 | International Management Experience (3) | Staff |
| | Same as Accy/Fina/IBus/Mgt/SMPP 297. May be repeated for credit. | |
| 298 | Directed Readings and Research (3) | Staff |
| 299 | Thesis Seminar (3) | Staff |
| 300 | Thesis Research (3) | Staff |
| 311 | Seminar: Public–Private Sector Institutions and Relationships (3) | Staff |
| | Same as SMPP 311. | |
| 341 | Seminar: Marketing (3) | Achrol, Dyer, Liebrecht-Himes, Rau, Hassan |
| | Examination of major theoretical developments in marketing. Open only to doctoral candidates. | |
| 397 | Doctoral Seminar (1 to 3) | Staff |
| 398 | Advanced Reading and Research (arr.) | Staff |
| | Limited to doctoral candidates preparing for the general examination. May be repeated for credit. | |
| 399 | Dissertation Research (arr.) | Staff |
| | Limited to doctoral candidates. May be repeated for credit. | |

MASTER OF BUSINESS ADMINISTRATION

Core courses for the M.B.A. program are listed here. See the School of Business for programs of study leading to the degrees of Master of Accountancy and Master of Business Administration.

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| 200 | Quantitative Methods and Computing Technologies (1.5) |
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A rigorous review of equations, functions, finite mathematics, calculus, and basic accounting, addressed through the use of business applications.

201 Global Leadership of Business Enterprise (0)

A series of required co-curricular workshops, seminars, company site visits and speakers. Topics include industry assessment, best practices in management, team building, business ethics, cross-cultural communication, and career development.

204 International Residency Practicum (1.5)

Precursor to the international residency. Teams of students work on real projects for overseas clients. Prerequisite: MBAd 243; corequisite: MBAd 244, 294.

211 Financial Accounting I: Basic Financial Statements (1.5)

The basic concepts and methods used in financial reports for understanding their content and context. The income statement, balance sheet, and statement of cash flows. Prerequisite: MBAd 200.

212 Financial Accounting II: Financial Accounting Choices (1.5)

Detailed accounting procedures and choices. How the most important accounting procedures are calculated and how different choices impact financial statements. Prerequisite: MBAd 211.

213 Managerial Accounting (1.5)

The internal generation, communication, and interpretation of information for both operational and strategic decision-making purposes. Prerequisite: MBAd 212.

221 Judgment, Uncertainty, and Decisions (1.5)

Classical theories of decision making; recent findings on human cognitive limitations and biases. Analytical approaches useful in cases involving uncertainty, multiple objectives, and multiple stakeholders. Prerequisite: MBAd 200.

222 Data Analysis and Decisions (1.5)

Statistical analysis—how it is used, when it should be used, and what can be learned from it. Statistical inference, hypothesis testing, and regression analysis. Prerequisite: MBAd 221.

223 Operations Strategy (1.5)

Concepts and techniques related to manufacturing and service operations. Process mapping, capacity analysis, production control, quality management, and supply chains. Integration of operations with a firm's overall business strategy as a powerful competitive weapon. Prerequisite: MBAd 222.

233 Financial Markets (1.5)

Sources of managerial information provided by money and capital markets, primary and secondary markets, and cash and futures markets. Money and capital market instruments, relevant return measures, risk metrics for bonds and equities.

Prerequisite: MBAd 212, 222, 242.

234 Financial Management (1.5)

Theory, policy, and practice in financial management. Financial analysis, sources of funds, investing, capital planning and budgeting, dividend policy, and working capital management. Prerequisite: MBAd 233.

241 Global Perspectives (1.5)

Differences between the domestic and international environments and their implications for management. Differences in the organization of institutions of capitalism across countries.

242 Microeconomics for the World Economy (1.5)

The economics of supply and demand in product markets. Theory of the firm (production and cost structure) and its competitive environment (perfect competition, monopoly, oligopoly, and monopolistic competition). Prerequisite: MBAd 200.

243 Macroeconomics for the World Economy (1.5)

How firms are affected by the performance of the macro economy and the macroeconomic variables that should be factored into managers' decision-making processes. The behavior of output, employment, interest rates, inflation, and exchange rates. Prerequisite: MBAd 242.

244 International Management (1.5)

The challenges of operating in different cultures, implications of cross-national differences in institutional environments, and difficulties of designing effective organizational structures for coordination and control in multinational operations. Prerequisite: MBAd 241.

252 Management of Information Systems (1.5)

An introduction to bridging the gap between the decision-making needs of managers and the terminology of technical personnel within an organization. The transformation of organizations in the digital economy.

253 Management of Technology and Innovation (1.5)

Business, technological, economic, and political factors that influence the development and adoption of new technology. Management concepts and practices useful in enhancing corporate innovation. Corporate venture divisions and organizational alternatives.

254 Database and Data Warehousing (1.5)

An introduction to the model, design, and use of database and data warehousing systems for identifying, understanding, and designing database-centric solutions for business and organizations.

261 Organizations and Leadership (1.5)

A behavioral perspective on core leadership concepts at the individual, team, and organizational level. Students apply these concepts to examine their own leadership qualities in organizations. Experiential exercises and participation in team projects.

262 Managing Human Capital (1.5)

Issues of corporate culture, strategy implementation, growth management, employee recruitment and retention, organizational behavior, diversity, ethics, and legal aspects of business. How human resource policies and practices can become a source of competitive advantage.

265 Entrepreneurship (1.5)

The “entrepreneur as a phenomenon.” The theory as well as the experiences associated with entrepreneurs, entrepreneurial acts, and entrepreneurship in all organizational settings—large and small, public and private.

272 Nature of Markets (1.5)

Marketing as an organizational function as well as a set of processes for creating, communicating, and delivering value to customers and for managing customer relationships in ways that benefit the organization and its stakeholders.

273 Marketing Decisions (1.5)

Formulation and implementation of marketing strategy, applying the analytic perspectives, decision tools, and concepts of marketing to the elements of marketing strategy. Prerequisite: MBAd 272.

281 Business Responsibility and Sustainability (1.5)

Businesses are experiencing increasing challenges and opportunities to ensure that they demonstrate integrity in all of their activities, both internal and external to their operations. Perspectives, information, and skill development in advancing the value of integrity in business organizations.

284 Business and Public Policy (1.5)

The theory and practice of managing organizations in the context of a rapidly changing global environment. Structure, design, and operation of organizations as interrelated systems and integration of internal and external environments.

285 Business Law and Communication (1.5)

The legal environment of business, with particular attention to the liability of organizations and their managers for contracts, torts, and crimes. Strategies for avoiding litigation, including the development of clear, concise, and accurate writing. Prerequisite: MBAd 291.

286 Strategy Formulation and Implementation (1.5)

An integrative approach to strategic management, stressing the general manager's perspective, strategy formulation, implementation of strategy and policy, and evaluation and control of strategy in various types of organizations. A capstone course to be taken after completion of all core requirements. Prerequisite: All other M.B.A. core courses.

291 Business Communications (1.5)

Practical and effective written and oral communication skills for the business environment. Focus on developing and delivering messages clearly, concisely, and effectively, and on learning to write in plain English. The purpose and mechanics of different forms of business communications. Strategies for routine communications challenges.

294 International Residency (1.5)

A real-life experience in the global environment, projects are provided by international or foreign companies. A representative of the company visits GW to work with students during the associated practicum. Students work on projects during the seven-week practicum prior to the international residency. Corequisite: MBAd 204, 244.

295 Interdisciplinary Projects (1 to 4) Staff

Project and experiential studies of an interdisciplinary nature involving student teams and faculty from more than one field of study. May be repeated for credit. M.B.A. Program Director approval is required.

298 Graduate Internship in Business and Management (0) Staff

Structured practical experience. Permission of instructor required.

MATHEMATICS

Professors H.D. Junghenn, M.M. Gupta, E.A. Robinson, F.E. Baginski, D.H. Ullman, J.

Przytycki, J. Bonin, V. Harizanov, Y. Rong, J.B. Conway (*Chair*)

Associate Professors M. Moses, W. Schmitt, L. Abrams, X. Ren

Assistant Professors I. Yi, A. Shumakovitch, H. Wu, M. Musielak

Master of Arts in the field of mathematics—Prerequisite: a bachelor's degree with a major in mathematics or comparable course work.

Required: the general requirements stated under Columbian College of Arts and Sciences. Students must complete 30 credit hours of approved course work in mathematics, with no more than 6 hours of approved 100-level courses, and must pass a comprehensive examination in three subjects selected from algebra, analysis, topology, applied math, and linear algebra/advanced calculus. For a detailed description of the program, see www.gwu.edu/~math/graduate/graduateprogram.html.

Master of Science in the field of applied mathematics—Prerequisite: a bachelor's degree with a major in mathematics or comparable course work.

Required: the general requirements stated under Columbian College of Arts and Sciences. Course work is divided between mathematics courses and approved courses from one area of application selected from physics, statistics, computer science, economics, or civil, electrical, mechanical, or systems engineering. Candidates must complete 30 credit hours of approved course work. At least 18 credit hours must be in mathematics courses, with no more than 6 hours of approved 100-level courses. A comprehensive examination must be passed in three subjects selected from algebra, analysis, topology, applied math, and linear algebra/advanced calculus.

For a detailed description of the program, see

www.gwu.edu/~math/graduate/graduateprogram.html.

Doctor of Philosophy in the field of mathematics—Required: the general requirements stated under Columbian College of Arts and Sciences. The General Examination consists of a preliminary examination in three subjects selected from algebra, analysis, topology, applied math, and linear algebra/advanced calculus, and a specialty examination in a research area approved by the department. A language examination to demonstrate reading knowledge of mathematics in an approved foreign language is also required. For a detailed description of the program, see www.gwu.edu/~math/graduate/graduateprogram.html.

With permission, some undergraduate courses in the department may be taken for graduate credit (additional course work is required). See the Undergraduate Programs Bulletin for course listings.

201–2 **Algebra I–II (3–3)** Abrams

Group theory including symmetric groups, free abelian groups, finitely generated abelian groups, Sylow theorems, solvable groups. Factorization in commutative rings, rings of polynomials, chain conditions, semisimple rings, Wedderburn–Artin theorems, Galois theory.

203 **Algebra III (3)** Abrams

An extension of the material of Math 201–2, including Frobenius’ theorem on associative division algebras, the Hurwitz problem on composition of forms, valuation theory, formally real fields, rings without finiteness conditions, elements of homological algebra with applications.

206 **Topics in Algebra (3)** Abrams, Schmitt

Topics chosen from Lie groups and Lie algebras, non-associative algebras, abelian groups, classical groups, algebraic number theory, representation theory, algebraic geometry, and ring theory. Prerequisite: Math 201–2. May be repeated for credit with permission.

211 **Complex Analysis (3)** Conway, Junghenn

Topology of the complex plane; complex differentiation and integration; Cauchy's theorem and its consequences; Taylor and Laurent series; classification of singularities; residue theory; conformal mapping; the Riemann mapping theorem. Prerequisite: Math 139 or equivalent.

214 **Measure and Integration Theory (3)** Conway, Robinson, Yi

Lebesgue measure and integration in abstract spaces. Probability measures. Absolute continuity, the Radon–Nikodym theorem, measures on product spaces, and the Fubini theorem. L^p spaces and their properties. Prerequisite: Math 139 or equivalent.

215 **Introduction to Functional Analysis (3)** Conway, Junghenn, Robinson

Topological and metric spaces; Tychonoff theorem; Banach spaces; linear functionals and operators; Hahn–Banach, closed graph, and open-mapping theorems; uniform boundedness; Hilbert spaces; eigenvalues, projections. Prerequisite: Math 214 or equivalent.

216 **Topics in Real and Functional Analysis (3)** Conway, Junghenn, Yi

Possible topics include Banach algebras, function algebras, spectral theory for bounded and unbounded operators, harmonic analysis on topological groups and semigroups, topological vector spaces and operator algebras. Prerequisite: permission of instructor. May be repeated for credit with permission.

217 **Ordinary Differential Equations (3)** Robinson

Existence and uniqueness of solutions, continuity and differentiability of solutions with respect to initial conditions. Properties of linear systems, phase portraits, planar systems and Poincaré–Bendixson theory. Prerequisite: Math 140.

218 **Applied Mathematics I (3)** Baginski, Ren

Dimensional analysis, perturbation methods, calculus of variations, boundary value problems in one dimension, eigenvalue problems, stability and bifurcation in nonlinear problems. Related numerical techniques. Prerequisite: Math 84 or equivalent.

219 **Applied Mathematics II (3)** Baginski, Ren

Method of characteristics, shock waves, wave and heat equation, Laplace operator on a bounded region, maximum principles, Green's functions, Schrödinger's equation, spherical harmonics. Numerical methods for partial differential equations. Prerequisite: Math 84 or equivalent.

221 **Modern Partial Differential Equations (3)** Baginski

Emphasis on modern theory and analytical techniques applied to the solution of partial differential equations. Topics include Sobolev spaces, generalized solutions, strong solutions and regularity; Sobolev imbedding theorem; Rellich–Kondrachov theorem; Leray–Schauder fixed-point theorems; nonlinear eigenvalue problems. Prerequisite: Math 219 or permission of instructor.

222 **Introduction to Numerical Analysis (3)** Gupta, Musielak

Computer arithmetic and round-off errors. Solution of linear and nonlinear systems. Interpolation and approximations. Numerical differentiation and integration.

- Eigenvalues and eigenvectors. Prerequisite: Math 32 and 84 and knowledge of a programming language.
- 223 **Numerical Solution of Ordinary and Partial Differential Equations (3)** Gupta
Initial and boundary value problems for ordinary differential equations. Error propagation, convergence and stability. Finite difference and finite element methods for partial differential equations. Prerequisite: Math 142 and knowledge of a programming language.
- 225 **Ergodic Theory (3)** Robinson, Yi
Ergodicity, mixing, the K-property and the Bernoulli property. Poincaré recurrence, the Rohlin lemma, the ergodic theorem, and entropy theory. Additional topics from isomorphism theory, spectral theory, the theory of joinings, and coding theory. Prerequisite: Math 214 or permission of instructor.
- 226 **Dynamical Systems and Chaos (3)** Robinson, Yi
Linear and nonlinear systems, flows, Poincaré maps, structural stability. Examples of chaotic systems in the physical sciences. Local bifurcations, center manifold theory, normal forms, the averaging theorem. Hyperbolic invariant sets, strange attractors, the Smale horseshoe, symbolic dynamics. Prerequisite: Math 84 and 140 or permission of instructor.
- 231 **Topics in Applied Mathematics (3)** Baginski
Possible topics include, but are not limited to, the calculus of variations, control theory, nonlinear partial differential equations, and mathematical programming. May be repeated for credit with permission.
- 232 **Topics in Numerical Analysis (3)** Gupta

Numerical methods and software. Introductions to the methods, tools, and ideas of numerical computation. Problem solving using standard mathematical software.

Interpolation; linear and nonlinear equations. Differential equations. Prerequisite: Math 142; knowledge of a programming language.

261 **Combinatorics** (3) Bonin, Schmitt

An introduction to fundamental methods and current research problems in partially ordered sets and enumeration. Prerequisite: undergraduate modern algebra and linear algebra or permission of instructor.

262 **Graph Theory** (3) Ullman

Graphical enumeration, factors, planarity and graph coloring, algebraic graph theory, extremal graph theory, applications. Prerequisite: undergraduate modern algebra and linear algebra or permission of instructor.

263 **Topics in Combinatorial Mathematics** (3) Bonin, Ullman, Schmitt

Topics selected from a wide range of research subjects in combinatorics, its relations with other areas of mathematics, and applications. Recent selections have included matroid theory, topological methods in ordered sets, algebraic methods in combinatorics, fractional graph theory, combinatorics of polytopes, the symmetric group. May be repeated for credit with permission.

271 **Mathematical Logic** (3) Harizanov, Moses

Model theory: the relation between a formal language (syntax) and its interpretations (semantics). Consistency, completeness, and compactness. Tarski's theorem on the inexpressibility of truth. Godel's incompleteness theorem and its impact on mathematics.

- 272 **Topics in Logic** (3) Harizanov, Moses

Topics selected from a broad spectrum of areas of logic and applications, based on students' suggestions and interests. May be repeated for credit with permission.

- 281 **General Topology** (3) Rong, Przytycki, Shumakovitch, Wu

Topological spaces, bases, open sets and closed sets; continuous maps and homeomorphisms; connectedness and compactness; metric topology, product topology and quotient topology; separation axioms; covering spaces and fundamental groups.

- 282 **Algebraic Topology** (3) Rong, Przytycki, Wu

Fundamental groups and the Van Kampen theorem; simplicial complexes, simplicial homology, and Euler characteristic; singular homology, Mayer–Vietoris sequences. Topics may include cohomology, cup products, and Poincaré duality; classification of surfaces; knots and their fundamental groups. Prerequisite: Math 281 or permission of instructor.

- 285 **Knot Theory and Low Dimensional Topology** (3) Rong, Przytycki

Introduction to fundamental methods and current research in knot theory and 3-dimensional topology. Topics include Reidemeister moves, Alexander invariants, Jones-type invariants, skein modules, Khovanov homology, incompressible surfaces, and torus decomposition. Prerequisite: Math 281 or permission of instructor.

- 286 **Topics in Knot Theory and Low Dimensional Topology** (3) Rong, Przytycki

Possible topics include, but are not limited to, topology of 3-manifolds and work of Perelman, quantum invariants and their categorizations, topology of 4-manifolds after Freedman and Donaldson, computational complexity in topology, and applications in

biology, chemistry, and physics. Prerequisite: Math 285 or permission of instructor.

May be repeated for credit with permission.

289 **Topics in Topology** (3) Rong, Przytycki, Shumakovitch, Wu

Topics may include hyperbolic structures on surfaces and 3-manifolds; knot theory; topology of 3-manifolds; topology of 4-manifolds. Prerequisite: Math 282 or permission of the instructor. May be repeated for credit with permission.

295 **Reading and Research** (arr.) Staff

May be repeated for credit.

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit.

MECHANICAL AND AEROSPACE ENGINEERING

Professors M.K. Myers, R.E. Kaufman, C.A. Garriss, J.D.-Y. Lee, Y.-L. Shen, A.D. Cutler, R.

Mittal, S.M. Hsu, D.S. Dolling, M.W. Plesniak (*Chair*)

Associate Professor R.R. Vallance

Assistant Professors D.F. Chichka, M. Keidar, P. Ben-Tzvi, Y. Leng

Adjunct Professor M.A. Imam

Professorial Lecturers B.W. Hannah, P. Matic, B. Whang, G.C. Everstine, R.C. Blanchard, S.S.

Dodbele, A. Rao, M.K. King, E. McCafferty, A. Auslander, J.K. Soldner, J.H. Milgram, J.M.

Fleming, D.R. Gerk, T.M. Krafchak, R. Krishnamurthy, M.A. Busby, G. Bae

See the School of Engineering and Applied Science for programs leading to the master's, professional, and doctoral degrees. A certificate program in computer-integrated design in mechanical and aerospace engineering is offered by the department.

- 201 **Introduction to Manufacturing (3)** Shen
- Fundamentals of modern manufacturing. Processes for manufacturing mechanical and electronic components from metals, polymers, ceramics, and silicon. Manufacturing systems, CAD, robotics, and design for assembly. Current capabilities, technological needs, and competitiveness. Examples from high-tech industries. Prerequisite: approval of department. (Fall)
- 203 **Experimental Techniques (3)** Cutler
- Sensors; measurement of displacement, temperature, pressure and velocity. Optical methods. Signal conditioning. Computer data acquisition. Uncertainty analysis. Case studies of instrumentation systems such as hot-wire anemometers, laser-doppler anemometers, shlieren/shadowgraph and interferometers. Laboratory projects. (As arranged)
- 207 **Theory of Elasticity (3)** Lee, Manzari
- Introduction to Cartesian tensors; deformation, stress, constitutive relations for linear elasticity; formulation of boundary value problems, variational principles, torsion and bending of prismatic rods, plane problems. Prerequisite: approval of department. Same as CE 221. (Spring)
- 210 **Continuum Mechanics (3)** Lee

- Kinematics of a continuum, equations of motion, linear isotropic elastic solid, Newtonian viscous fluid, integral formulation of general principles, simple applications. Prerequisite: approval of department. (Fall)
- 220 **Applied Computational Fluid Dynamics (3)** Staff
- Basic principles of fluid dynamics and aerodynamics. Finite difference and finite volume methods. Fluid flow and heat transfer analysis of thermo-fluid mechanical systems. Computational aerodynamics codes. Individual hands-on experience with a commercial CFD code such as FLUENT. Prerequisite: approval of department. (Fall)
- 221 **Fluid Mechanics (3)** Garriss, Myers
- Continuum, kinematics of fluids; stress and strain rate tensors; fundamental equations of viscous compressible flows. Irrotational flows; sources, sinks, doublets, and vortices. Laminar flow of viscous incompressible fluids; boundary-layer concept. Prerequisite: approval of department. (Fall)
- 222 **Applied Aerodynamics (3)** Staff
- Introduction to practical and computational methods for solving two-dimensional and three-dimensional aerodynamics problems. Linear methods, nonlinear potential methods, coordinate transforms, and boundary-layer methods. Prerequisite: MAE 221, 286. (As arranged)
- 223 **Turbomachinery (3)** Garriss
- Turbine, compressor, and pump types and uses; dimensional analysis of turbomachines; cycle analysis of gas and steam turbines; energy interchange in fluid machinery; design, characteristics, and performance of turbines, compressors, and

- pumps; comparison of types of turbines, compressors, and pumps. Prerequisite: MAE 221. (Fall, odd years)
- 224 **Viscous Flow** (3) Cutler, Plesniak
Exact solutions of Navier–Stokes equations; the laminar boundary-layer theory.
Reynolds stresses and turbulence; internal, boundary-layer, and mixing flows.
Applications to heat and mass transfer and to reacting flows. Prerequisite: ApSc 213, MAE 221, or equivalent. (Fall, even years)
- 225 **Computational Fluid Dynamics** (3) Mittal
Theory of discrete methods for solving the governing equations of fluid dynamics.
Potential flow, Euler equations, Navier-Stokes equations. Emphasis on algorithm development appropriate to modern supercomputers. Prerequisite: MAE 221, 286.
(Spring)
- 226 **Aero/Hydrodynamics** (3) Mittal, Plesniak
Inviscid flows in two and three dimensions and irrotational flow theory; conformal mapping and applications. Helmholtz theorems and vorticity dynamics. Applications such as airfoil theory, finite wing theory, panel methods, instabilities, free surface flow. Prerequisite: MAE 221 or equivalent. (Spring)
- 227 **Aeroelasticity** (3) Staff
Static and dynamic structural deformations; static aeroelasticity (structural deformation, divergence, control effectiveness, and reversal); dynamic aeroelasticity (flutter, response to gusts and turbulence); unsteady aerodynamics for 2-D wings; strip theory for 3-D lifting surfaces; piston and Newtonian-flow theories. Prerequisite: MAE 221, 257. (As arranged)

- 228 **Compressible Flow (3)** Cutler, Garriss
- Thermodynamics and equations of compressible inviscid flow. One-dimensional flow. Isentropic flow. Normal and oblique shock waves. Quasi-one-dimensional flow. Unsteady one-dimensional and steady two-dimensional flow. Introduction to transonic flow. Prerequisite: ApSc 213, MAE 221 or equivalent.
- (Spring, even years)
- 229 **Propulsion (3)** Cutler, Garriss
- Basic concepts of propulsion: energy transformations in propulsive flows, gas dynamics of combustion. Thermal and propulsive efficiencies. Cycle and engine component analysis. Intake, nozzle performance. Drag and thrust generation. Augmentation. Propellers, turbojets, turbofans, ramjets, and rockets. Prerequisite: approval of department. (Spring)
- 230 **Space Propulsion (3)** Staff
- Advanced chemical propulsion: dynamic combustion and instabilities in solid propellants. Injection, atomization, mixing in liquid propellant engine performance. Plasma propulsion: electrostatic, electromagnetic, and electrothermal instabilities (laser and microwave). Nuclear propulsion. Prerequisite: MAE 229.
- (Spring, even years)
- 231 **Structure and Transformations in Materials (3)** Staff
- Structure of crystals, crystal binding, crystal defects, dislocations, solid solutions, phases, diffusion, phase transformations, deformation twinning, and martensite. Prerequisite: ApSc 130. (Fall, odd years)
- 232 **Fracture Mechanics (3)** Lee

- Fundamentals of brittle fracture, Griffith theory and extensions, mechanics of fracture. Linear elastic systems, plasticity considerations, fracture toughness. Engineering analysis, notch-strength analysis with limit approach, crack-propagation laws, fatigue, fracture testing. Prerequisite: approval of department.
(Spring, even years)
- 233 **Mechanics of Composite Materials (3)** Lee, Manzari
Stress-strain relationship for orthotropic materials, invariant properties of an orthotropic lamina, biaxial strength theory for an orthotropic lamina. Mechanics of materials approach to stiffness, elasticity approach to stiffness. Classical lamination theory, strength of laminates. Statistical theory of fatigue damage. Prerequisite: approval of department. Same as CE 223. (Spring, odd years)
- 234 **Composite Materials (3)** Staff
Principles of composites and composite reinforcement. Micromechanics and failure, interface reactions in various composites, reinforcing materials. Structure of composites: fiber-reinforced polymers, filler-reinforced polymers, fiber-reinforced metals, directionally solidified alloys, dispersion-strengthened metals. Prerequisite: approval of department. (Spring, even years)
- 235 **Deformation and Failure of Materials (3)** Staff
Elastic and plastic deformation, yield, dislocation theory, strengthening mechanisms, creep, polymers, fracture, transition temperature, microstructure, fatigue.
(Spring, odd years)
- 237 **Applied Electrochemistry (3)** Staff

Charged interfaces, electrochemical cells, corrosion thermodynamics, electrode kinetics, general corrosion, crevice corrosion, pitting, stress-corrosion cracking, corrosion protection, batteries and fuel cells, energy storage. May include current and potential distribution in electrochemical cells and scaling effects in modeling.

Prerequisite: approval of department. (Fall, even years)

238 **Biomaterials (3)** Staff

Applications of materials science and engineering to artificial materials in the human body with the objective of detailed understanding of synthetic materials and biopolymers. Biocompatibility and its consequences on tissue–implant interfaces. Design and development of new implant materials, smart drugs, and drug delivery systems. Prerequisite: MAE 166 or 168. (Fall)

240 **Kinematic Synthesis (3)** Kaufman

Techniques for the analysis and synthesis of function, path, and motion generating mechanisms. Methods for the dimensional design of mechanisms. Computer-aided techniques for the optimal design of planar linkages. Review of recent developments and current research. Term project. Prerequisite: MAE 190 or equivalent. (Spring, odd years)

241 **Computer Models of Physical and Engineering Systems (3)** Vallance

Reduction of physical and engineering systems to simplified physical and mathematical models. Manipulation of models using C/C++ programming. Numerical algorithms for optimization, graph identification, mini-sum arithmetic, and searching. Styles of problem solving. Prerequisite: MAE 117. (Spring)

- 242 **Advanced Mechanisms (3)** Kaufman
- Emphasis on spatial kinematics. Analysis and synthesis of mechanisms. Analytical techniques using matrices, dual numbers, quaternion algebra, finite and instantaneous screws, theory of envelopes. Applications to design of linkages, cams, gears. Use of digital computers in mechanism analysis and design. (Spring, even years)
- 243 **Advanced Mechanical Engineering Design (3)** Staff
- Design of mechanical engineering components and systems emphasizing computer-aided engineering (CAE), including interactive computer graphics, finite element analysis, and design optimization. Creation of a complete design on an engineering workstation. Prerequisite: approval of department. (Fall)
- 244 **Computer-Integrated Engineering Design (3)** Staff
- Design of engineering components and systems on engineering workstations using I-DEAS. Interactive computer graphics, finite element analysis, computer-based design optimization, and other relevant computer-based tools. Students apply design concepts in a computer-aided engineering environment to a selected project.
- Prerequisite: approval of department. (Spring)
- 245 **Robotic Systems (3)** Lee
- Classification, features, and applications of industrial robots. Spatial descriptions and transformations, forward and inverse kinematics. Jacobian matrix, velocities and static forces, manipulator dynamics and controls. Robot actuators, transmissions, sensors, end effectors, and programming. Prerequisite: MAE 182 or equivalent.
- (Spring)
- 246 **Electromechanical Control Systems (3)** Lee

State-space approach to control system analysis and design. Controllability and observability. Optimal stochastic control theory. Introduction to sliding mode control. Applications to robotics and earthquake engineering. Course emphasizes individual hands-on experience with the use of MatLab. Prerequisite: approval of department. (Spring)

247 **Aircraft Design I (3)** Staff

Conceptual design methods used in response to prescribed mission and performance requirements, alternate configuration concepts. Configuration general arrangement and empennage sizing. Estimation of aircraft size, weight, and balance; lift, thrust and drag; system level tradeoff and sensitivity studies. (Spring)

248 **Aircraft Design II (3)** Staff

Preliminary design methods used to refine a conceptual aircraft configuration. Area ruling, computer-aided design methods and structural arrangement, estimation of aircraft static and dynamic stability and control sizing, inlet design, detailed tradeoff and sensitivity studies, economic and reliability considerations. (Spring)

249 **Spacecraft Design (3)** Staff

Computer-aided design of spacecraft and satellites to meet specific mission requirements. Environment, propulsion, structure, heat transfer, orbital mechanics, control considerations. Use of modern computer codes for design studies.

Prerequisite: approval of department. (Fall)

250 **Launch Vehicle Design (3)** Staff

Computer-aided design of hypersonic launch vehicles to meet specific mission requirements. Propulsion, structures, flight path, aerothermochemistry, control

- considerations. Use of modern computer codes for design studies. Prerequisite: approval of department. (Spring, odd years)
- 251 **Computer-Integrated Manufacturing (3)** Shen
- Automation techniques for processing metals, polymers, and composites. Use of sensing and process modeling in process control. Numerical control and robot applications and limitations. Integration, scheduling, and tool management in the computer-integrated factory. Quality control. Social and economic considerations in CIM. Prerequisite: MAE 192 or equivalent. (Spring)
- 252 **Projects in Computer-Integrated Design and Manufacturing (3)** Shen
- Applications of the concepts of computer-integrated manufacturing to group projects, culminating in written and oral presentations. Robot programming, vision-guided assembly, force sensing, fixturing, and end-effector design for practical applications. Factory simulation, part scheduling, and NC program-verification algorithms. Prerequisite: MAE 251. (Fall, odd years)
- 253 **Aircraft Structures (3)** Staff
- Statics of thin-walled beams and panels, force interplay between stiffeners and skin in the analysis and design of stiffened thin-walled structures. Strength and stiffness of locally buckled stiffened structures. Design considerations. Critical evaluation of various design procedures. Prerequisite: approval of department. (As arranged)
- 257 **Theory of Vibrations (3)** Lee and Staff
- Damped and undamped natural vibration, response of single- and multiple-degrees-of-freedom systems to steady-state and transient excitations, modal analysis, nonproportional damping and complex modes, variation formulation of equations of

- motion, discretization of structural systems for vibrational analysis. Prerequisite: approval of department. (Fall)
- 261 **Air Pollution** (3) Staff
- Introductory course on the generation, monitoring, and control of air pollution. Atmospheric pollutants; current levels and health problems. Combustion chemistry and mixing. Photochemical processes; smog and measurements. Atmospheric dispersion; inversion and acid rain. Prerequisite: approval of department. (Fall, odd years)
- 262 **Energy Systems Analysis** (3) Staff
- Analysis of energy resources and conversion devices. Statistical data analysis, forecasting, I/O, and net energy analyses, mathematical modeling. Prerequisite: approval of department. (Fall)
- 270 **Theoretical Acoustics** (3) Myers
- Basic acoustic theory in stationary and uniformly moving media; waves in infinite space; sound transmission through interfaces; sound radiation from simple solid boundaries, source and dipole fields; propagation in ducts and enclosures; elements of classical absorption of sound. Prerequisite: ApSc 213, MAE 221. (As arranged)
- 271 **Time Series Analysis** (3) Myers
- Harmonic analysis of random signals; auto- and cross-correlations and spectra; coherence; modern techniques for spectral estimation, including fast Fourier transform, maximum entropy, and maximum likelihood; bias and variability; randomly sampled data; digital filtering; applications. Prerequisite: approval of department. (As arranged)

- 273 **Principles of Automatic Flight Control (3)** Staff
Design of aeronautical instrumentation and feedback controls; mathematical models of sensors, controllers, and actuators; theory of feedback control, stability, accuracy, and speed of response; equalization effects of nonlinearities and noise. Prerequisite: approval of department. (Spring)
- 274 **Spacecraft Dynamics (3)** Chichka
Fundamentals of satellite attitude dynamics and passive stabilization. Spacecraft attitude representation, rotational kinematics and kinetics. External torques. Dynamics of gyroscopes. Gravity gradient stabilization. Effect of internal energy dissipation on stability of spinning bodies and methods of despin. Dual spin satellites. Prerequisite: approval of department. (Spring, even years)
- 275 **Stability and Control of Aircraft (3)** Staff
Derivation of equations of motion, Euler transformations and direction cosines, stability derivatives and linearization of equations of motion, stability of linear systems with application to longitudinal and lateral dynamics, Laplace transform techniques, and frequency-response analysis. Prerequisite: approval of department. (Fall, even years)
- 276 **Space Flight Mechanics (3)** Chichka
Coordinate and time systems. Newton's laws; 2-, 3-, and n-body problems, Lagrange points, gravity-assisted trajectories, variation of parameters and orbit perturbations, non-central gravity effects, drag, sun-synchronous, and formation orbits. Numerical applications using MatLab. Prerequisite: approval of department. (Fall)
- 277 **Spacecraft Attitude Control (3)** Staff

- Control of spinning and three-axis stabilized spacecraft. Elements of linear control theory for single-input, single-output systems and basic feedback control laws. Momentum management and actuator desaturation. Sensors for attitude determination. Application of modern control for multi-input, multi-output systems. Control system simulations using MatLab. (As arranged)
- 278 **Space Flight Guidance and Navigation (3)** Staff
Fundamentals of spacecraft guidance and navigation. Single, double, and multi-impulse orbit changes, Lambert's Theorem, rendezvous and interception, batch and sequential orbit determination, guidance strategies for fixed and variable flight time problems. Numerical applications using MatLab. (Fall, even years)
- 280 **Intermediate Thermodynamics (3)** Staff
Review of First and Second Laws of Thermodynamics and combining the two through exergy; entropy generation minimization and applications. Single phase systems, exergy analyses, multiphase systems, phase diagrams and the corresponding states principle. Prerequisite: approval of department. (Fall)
- 281 **Advanced Thermodynamics (3)** Staff
Development of classical and quantum statistical mechanics, including Maxwell-Boltzman distributions and microscopic origins of entropy and other thermodynamic variables. Partition functions and micro- and grand-canonical ensembles; Fermi-Dirac, Bose-Einstein, and intermediate statistics. Einstein and Debye models of solids. Prerequisite: MAE 280 or equivalent. (As arranged)
- 282 **Convective Heat and Mass Transfer (3)** Cutler, Garriss

Heat and momentum transfer in laminar and turbulent flow. The laminar boundary-layer solution. Similarity and nondimensional parameters. Mass-momentum heat transfer analogy. Convective heat transfer at high velocity. Stability, transition, and turbulence. Free convection. Prerequisite: MAE 221 or equivalent.

(Spring, odd years)

283 **Radiative Heat Transfer (3)**

Cutler

Basic concepts of heat transfer by thermal radiation starting from Planck's equation for blackbody radiation. Realistic engineering problems are addressed, some involving radiative heat transfer with a variety of surfaces, geometries, and enclosures. Radiative heat flow combined with conduction and convection boundaries. Prerequisite: approval of department. (Fall, odd years)

284 **Combustion (3)**

Garris

Basic combustion phenomena. Rate processes and chemical kinetics. Chain reaction theory. Detonation, deflagration, diffusion flames, heterogeneous combustion. Experimental measurements. Impact of pollution regulations and alternate fuels. Prerequisite: approval of department. (Spring, even years)

286 **Numerical Solution Techniques in Mechanical
and Aerospace Engineering (3)**

Staff

Development of finite difference and finite element techniques for solving elliptic, parabolic, and hyperbolic partial differential equations. Prerequisite: ApSc 213 or equivalent. (Fall)

287 **Applied Finite Element Methods (3)**

Lee

- Basic aspects of theory and application of finite element methods. Utilization of MSC/NASTRAN for static, dynamic, linear, and nonlinear analyses of problems in mechanical, aeronautical, and astronautical engineering. Course emphasizes individual hands-on experience with the MSC/NASTRAN code. Prerequisite: approval of department. (Fall)
- 288 **Advanced Finite Element Analysis (3)** Lee, Manzari
- Review of variational formulation of the finite element method. Formulation of various continuum and structural elements. Application to static and dynamic problems in elasticity, plasticity, large deflection, and instability in plates and shells. Recent developments in finite element methods. Same as CE 228. Prerequisite: MAE 210, 286; or CE 220, 227. (Spring, even years)
- 290 **Special Topics in Materials Science (3)** Staff
- Selected subjects of current interest. Arranged by consultation between department faculty and students. Typical topics include experimental methods in materials science and nondestructive inspection of materials. Prerequisite: approval of department. (As arranged)
- 291 **Special Topics in Mechanical Engineering (3)** Staff
- Selected subjects of current interest. Arranged by consultation between department faculty and students. Typical topics include tribology, power systems design, solar heating systems, HVAC, and plasticity theory. Prerequisite: approval of department. (As arranged)
- 292 **Special Topics in Aerospace Engineering (3)** Staff

- Selected subjects of current interest. Arranged by consultation between department faculty and students. Typical topics include environmental noise control, aeroacoustics, hypersonic flow, and flight vehicle aerodynamics. May be repeated for credit. Prerequisite: approval of department. (As arranged)
- 298 **Research (arr.)** Staff
- Basic research projects as arranged. May be repeated for credit.
- 299-300 **Thesis Research (3-3)** Staff
- 350 **Advanced Topics in Materials Science (3)** Staff
- Topics such as surface science that are of current research interest. Selected after consultation between department faculty and students. Prerequisite: approval of department. (As arranged)
- 351 **Advanced Topics in Mechanical Engineering (3)** Staff
- Topics such as advanced analytical mechanics, advanced mechanics of continua, and advanced theory of elasticity that are of current research interest. Selected after consultation between department faculty and students. Prerequisite: approval of department. (As arranged)
- 352 **Advanced Topics in Aerospace Engineering (3)** Staff
- Topics such as nonsteady flow, physical gas dynamics, turbulence, and nonlinear wave propagation that are of current research interest. Selected after consultation between department faculty and students. Prerequisite: approval of department. (As arranged)
- 398 **Advanced Reading and Research (arr.)** Staff

Limited to students preparing for the Doctor of Philosophy qualifying examination.

May be repeated for credit.

399 Dissertation Research (arr.)

Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit.

MEDIA AND PUBLIC AFFAIRS

Professors C.H. Sterling, J.B. Manheim, S.V. Roberts, R.M. Entman, L. Huebner (*Director*), F.

Sesno, S.L. Livingston, M.G. Freedman

Associate Professors J.E. Steele, L.S. Harvey, A.L. May III, M. Feldstein, P.F. Phalen, S. Aday,

R. Russell, K.A. Gross

Assistant Professors S. Keller, N. Seavey (*Research*), J.M. Shanahan, S. Waisbord

Master of Arts in the field of media and public affairs—Prerequisite: An undergraduate degree in a related field.

Required: the general requirements stated under Columbian College of Arts and Sciences and completion of 36 credit hours as follows.

1. SMPA core courses (15 credit hours)—SMPA 202, 203, 205, 210, 241. Students with extraordinary backgrounds can petition for exemption from any of the core courses.

2. Students take five courses (15 credit hours) in an area of specialization, with approval of advisor. Students develop a program of study with the advisor and may take the courses in other GW departments or schools. One of the courses (3 credits) may be a supervised internship with a Washington organization working in areas relevant to the specialization. In all cases, the burden is on students and advisors to choose courses for their coherence and relevance to the specialization.

3. Students complete 6 additional credits in one of the following ways as approved by the advisor: writing a research thesis; writing a supervised in-depth journalism project; writing a supervised strategic communication report addressed to the solution of a client's communication-related problem; or taking two additional graduate courses coherently related to the specialization (with a minimum grade of *B+*), followed by a comprehensive examination.

A graduate certificate in documentary filmmaking is offered by the School of Media and Public Affairs. Information is available at www.gwu.edu/doccenter.

With permission of the advisor, a limited number of 100-level undergraduate courses may be taken for graduate credit; additional course work is required.

202 Theories of Mediated Political Communication (3) Aday and Staff

Institutional functions and individual effects of mediated communication. Impacts of different textual content and format on individual thinking and emotion; forces that shape content production.

203 **Comparative Media Systems (3)** Waisbord and Staff

Systematic exploration of the forms of mediated communication across countries and cultures, including their institutional shape and functions; relationships among market pressures, communication policies, political cultures, and party systems; and effects of the media systems on the politics and policies of various countries.

204 **Strategic Political Communication (3)** Manheim and Staff

Theory, techniques, and implications of strategic communication as employed by individuals, groups, organizations, and governments to advance their interests; applications to non-electoral politics and policymaking; use of political,

psychological, sociological, and other processes; methodological considerations; domestic and international applications.

205 **Media and Globalization (3)**

Huebner, Steele, Waisbord

Theories of media and globalization. The changing role of communication media, including the Internet and other newer technologies as well as traditional books, film, newspapers, telephone, and satellite in establishing closer relationships and interdependencies among people, their cultures, and their organizations in various countries.

210 **Media and Foreign Policy (3)**

Livingston and Staff

The effects of U.S. media on U.S. and foreign governments, and of foreign media on the U.S.; effects of other countries' media on each other; the impact of the Internet, inexpensive global phoning, CNN, al Jazeera, and other newer technologies and networks on the stuff of international relations: diplomacy, military operations, trade negotiations.

230 **Principles and Methods of Documentary Filmmaking (3)**

Seavey

Analytical and practical exploration of the elements of documentary filmmaking. The genres of nonfiction filmmaking; fundamentals of film conceptualization, documentary screenwriting, story structure, and production theory; and basic practical elements of production. Admission by permission of instructor.

231 **Documentary Filmmaking Practicum (6)**

Seavey

Intensive practical experience in documentary film production. Students produce a 10–15-minute documentary film on a selected topic. Emphasis on major markers in film production: treatment and script writing, location shooting, Final Cut Pro editing,

graphics, music, and final sound mix. Prerequisite: SMPA 230 and permission of instructor.

241 **Research Methods (3)** Gross and Staff

Design, applications, and limitations of quantitative research as applied to the field of media and public affairs. Framing of research questions, identification of variables and formulation of hypotheses, measurement, sampling, data gathering techniques, data analysis, and preparation of research reports. Brief exposure to qualitative research. Prerequisite: an undergraduate statistics course.

250 **Topics in Media Processes and Institutions (3)** Staff

Topics address such issues as the history of media content, institutions, and process; impact of changing communication technology on culture; history and development of mass-produced culture; and professional ideology and practice of journalism. May be repeated for credit provided the topic differs.

251 **Development of American Electronic Media (3)** Sterling

History of the development of radio, television, cable, and newer electronic media services. Examination of changing technologies, industry structures (national and local) and economics, program trends, audience research and impact, and regulation and policy.

252 **History of Investigative Journalism (3)** Feldstein

Investigative reporting in the United States from colonial times to the present. What is investigative reporting? How has it evolved over the years? What are its strengths and weaknesses? Why does it matter? Examination of the major issues in contemporary investigative reporting.

260 **Topics in Theory and Effects (3)** Aday, Phalan, and Staff

Topics address such issues as the relationship between broadcast content and the construction of social perceptions; anthropology of media; and viewership, readership, and the changing global audience.

270 **Topics in Media and Public Affairs (3)** Staff

Topics explore such areas as social theories of public opinion and mass media's response; and the role of mass media in constructing social perceptions of the scientific process and its relationship to cultural and material life.

271 **Media in the Developing World (3)** Steele, Waisbord

Examination of changes in thinking about the role of the press in economic, social, and national development. Topics may include the Cold War model of the press as an agent of modernization, development journalism, post-colonial responses to Western "cultural imperialism," media and Islam, the role of the Internet, and theories of the media and globalization.

272 **Media Bias, Power, and Democracy (3)** Entman

Consideration of the available scholarly evidence in order to develop a more sophisticated empirical and theoretical understanding of what constitutes media bias. How do we recognize and measure bias? Are there patterns in decisions about news coverage that indicate bias? Which political parties and economic interests benefit from patterns of news coverage?

273 **Race, Media, Politics, and Policy (3)** Gross, Entman

The place of race in American society and politics, with special attention to the role of the media. Drawing on work from a range of disciplines, the course explores

communicated images of racial minorities and their impact on public opinion, intergroup relations, and U.S. politics and public policy.

274 **Media and War (3)** Aday

Historic and contemporary examination of the media's role in wartime. Topics include covering war, the role of the media in generating support for foreign intervention, propaganda, effects of war coverage on public opinion, media and genocide, and public diplomacy. Ethical, philosophical and political implications of the media's role.

280 **Topics in Research (3)** Staff

Advanced research methods used in the study of media effects, history, law, and policy. May be repeated for credit with departmental approval. Prerequisite: SMPA 241.

296 **Directed Readings and Research (3)** Staff

Independent research with SMPA faculty member. Must be approved in advance by supervising professor and director of graduate studies. May be repeated for credit with departmental approval.

297 **Field Experience (1 to 3)** Staff

Students spend 12–20 hours per week in an approved position. Outside reading and/or research under the supervision of an SMPA faculty member. Graded *CR/NC* only.

May be repeated for credit with departmental approval.

298 **Independent Study (1 to 3)** Staff

Independent research project conducted with a faculty advisor. Must be approved by director of graduate studies.

299–300 **Thesis Research (3–3)**

MICROBIOLOGY AND IMMUNOLOGY

D. Leitenberg (*Director*), J. Bethony, M. Bottazzi, P. Brindley, M. Bukrinsky, A. Colberg-Poley, S. Constant, E. DeFabo, B. Fowlkes, J. Hawdon, R. Hawley, P. Hotez, A. Hurwitz, F. Kashanchi, I. Khan, A. Kumar, S. Ladisch, K. Nagaraju, F. Noonan, L. Pinto, S. Radoja, M. Rose, J. Schlom, G. Simon, C. Smith, S. Vukmanovic

Doctor of Philosophy in the field of microbiology and immunology—Prerequisite: A bachelor's degree in biological sciences, chemistry, or a related field.

Required: the general requirements stated under Columbian College of Arts and Sciences. Course work must include the biomedical sciences core curriculum, Micr 210, an approved statistics course, and either Micr 201 or 230. Recommended electives include Bioc 234, 250; Micr 233; MMed 221, 222.

Research fields: Apoptosis, autoimmunity, T-cell development, gene therapy, immune regulation, phylogeny of the immune system, tumor immunology, UV effects on cellular immunity, asthma, allergy.

201 Interdisciplinary Medical Microbiology (5)

An interdisciplinary approach to the study of infectious organisms and associated diseases by combining aspects of fundamental microbiology, infectious disease, pharmacology, and pathology.

210 Infection and Immunity (3)

An introduction to the fields of virology, bacteriology, and parasitology, as well as the main concepts of immune response.

220 Biology of Parasitism: Parasite Strategies of Infection,

Survival, and Transmission (2)

A comprehensive course examining the strategies parasites use to infect their hosts, how they survive and thrive within their host, and the developmental adaptations they use to ensure transmission of their offspring to the next host. Prerequisite: BiSc 139 or permission of instructor.

229 Immunobiology of Infections (2)

The immunobiology of parasite infections in humans and animal models of disease with a focus on host/parasite interactions during immune stimulation vs. immune evasion.

230 Molecular and Cellular Immunology (3)

Major aspects of immunology, including T and B cell development, the major histocompatibility complex, and immune regulation. Prerequisite: BmSc 213 or equivalent with approval of staff. (Fall)

233 Virology (3)

Biochemical, genetic, and pathogenic characterization of viruses. Prerequisite: Bioc 221–22 or permission of instructor. (Spring)

235 Human and Transforming Viruses (3)

Current concepts of transformation and disease caused by RNA and DNA viruses. Prerequisite: Micr 233. (Fall)

236 Fundamentals of Genomics (2 or 3)

Same as Bioc 236.

237 Fundamentals of Proteomics (2 or 3)

Same as Bioc 237.

250 **Applied Bioinformatics (2)**

Bioinformatics tools available for DNA/RNA and protein sequence analysis, structural analysis, and data mining.

270 **Advanced Topics in Immunology (3)**

Seminar series on topics chosen jointly by students and faculty; students present and critique original manuscripts. May be repeated for credit. Prerequisite: Micr 229, 230, or approval of staff. (Spring)

292 **Tropical Infectious Diseases (2)**

Lecture course. Pathogenesis, natural history, and epidemiology of the major infectious diseases that occur in developing countries.

293 **Special Topics (arr.)**

Selected topics in microbiology. May be repeated for credit provided the topic differs.

398 **Advanced Reading and Research (arr.)**

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.

399 **Dissertation Research (arr.)**

Limited to Doctor of Philosophy candidates. May be repeated for credit.

MOLECULAR MEDICINE

B. Bouscarel (*Director*), M. Batshaw, M. Bell, P. Berg, S. Ceryak, V.A. Chiappinelli, A. Chiamello, E.C. DeFabo, S. Dopkins, S.W. Fu, V. Gallo, A.L. Goldstein, Y. Hathout, R. Hawley, T. Haydar, E. Hoffman, V. Hu, F. Kashanchi, K.A. Kennedy, E. Kirkness, J.M. Krum, A. Kumar, S. Ladisch, P. Latham, N. Lee, C.W. Linebaugh, T. McDonald, H.G. Mandel, T. McCaffrey, D. Mendelowitz, S.A. Moody, T.W. Moody, J. Neiderhiser, F.P. Noonan, T.

O'Brien, R.K. Packer, S.R. Patierno, D.C. Perry, K.D. Peusner, J. Philbeck, D. Reiss, M.

Rojkind, M.C. Rose, J.M. Rosenstein, L.A. Rothblat, N. Sarvazyan, E.M. Sorenson, M.A. Stepp,

Y. Su, L.L. Werling

Doctor of Philosophy in the field of molecular medicine—Prerequisite: A bachelor's degree in chemistry, biological sciences, or an approved related field.

Required: the general requirements stated under Columbian College of Arts and Sciences.

Course work must include the biomedical sciences core curriculum, with MMed 213, 214, and one of the following: Anat/Idis 212, Phar 205, or MMed 221. Pertinent electives include MMed 280, 222, Bioc 250; BiSc 249, 274, 275; Psyc 268 or 281.

Research fields: neuroscience—neural transplantation, molecular mechanisms of action of drugs of abuse, neurotransmitter systems, developmental neurobiology, psychobiology of learning and memory, function of ion channels, receptors, and transporters; oncology—cancer chemotherapy and mechanisms of resistance, UV light, tumor cell biology and metabolism, gene regulation, oncogenes and tumor suppressor genes, growth factors, chemotherapy and mechanisms of resistance, immunotherapy, development of immunological and molecular markers for diagnosis and detection, tumor immunology, epidemiology and prevention, cancer and AIDS, mechanisms of metastasis, transgenic models of cancer; pharmacology—molecular carcinogenesis, genetic toxicology, cancer chemotherapy, neuropharmacology, biochemical and molecular pharmacology and toxicology.

213 Molecular Medicine I (3)

Physiological bases of major organ systems and origins of disease. Prerequisite:

BmSc 210, 211, 212.

214 Molecular Medicine II (2)

Research topics in molecular medicine, including cellular and behavioral neuroscience, pharmacology, physiology, and pathophysiology. May be repeated for credit. Prerequisite: MMed 213 and consent of instructor.

221 The Basic Science of Oncology (3)

Epidemiology, genetics, viruses, oncogenes, chemical carcinogenesis, radiation carcinogenesis, tumor growth, metastasis, biochemistry of cancer cells, tumor markers, hormones and cancer, cancer immunobiology, radiotherapy, chemotherapy and immunotherapy. (Fall)

222 Molecular Oncology (2)

Seminar course dealing with molecular basis for the topics introduced in MMed 221. (Spring)

280 Neurophysiology and Neuropharmacology (3)

Basic principles of electrophysiology and electrophysiological techniques. Basic principles of neuropharmacology, including neurobiological basis for mental health and disease. (Spring)

398 Advanced Reading and Research (arr.)

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.

399 Dissertation Research (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit.

MUSEUM STUDIES

Committee on Museum Studies

K. Rice (*Director*), J. Blomster, B. Craig, M. Morris, M. Norton, J. Vlach

Columbian College of Arts and Sciences offers an interdepartmental program leading to the degree of Master of Arts in the field of museum studies. The program is designed for those who seek a deepening of their primary academic interest along with training in the broad range of talents required in the successful operation of museums. The goal of the program is to produce graduates who are prepared to assume museum positions that require both scholarship and functional skills. (Students whose career interests are primarily curatorial should consider applying for the Master of Arts in their academic discipline with a concentration in museum training; those interested in museum education should refer to the Master of Arts in Teaching under the Graduate School of Education and Human Development.)

Students applying to the Museum Studies Program must meet all general requirements for admission to Columbian College of Arts and Sciences. The student must have an undergraduate major, or its equivalent, relevant to the proposed academic core and must be able to demonstrate a sufficient breadth of academic preparation to support the proposed graduate course of study. Prior museum training is recommended.

In preparing the academic core portion of the program of study, students draw on courses offered by the appropriate academic departments. Courses that pertain to the museum studies portion of the program are described below and are supplemented by additional courses offered by other departments, such as American Studies, Anthropology, History, Educational Leadership, Fine Arts and Art History, and Theatre and Dance.

Master of Arts in the field of museum studies—Required: the general requirements stated under Columbian College of Arts and Sciences. The degree requires a minimum of 42 hours of course work, including MStd 202 and 215. At least 15 credits of course work must be in an academic core discipline, such as American studies, anthropology, biological sciences, hominid

paleobiology, history, or an appropriate interdisciplinary combination. (A concentration in art history is possible only in the Department of Fine Arts and Art History.) At least 15 credits of course work must be in museum studies courses that concern such functions as museum administration, collections management, exhibiting, and object care and conservation. At least 6 credits must be in museum internships in the Washington area or elsewhere. The student must pass a comprehensive examination based on course work and submit a research paper.

Two graduate certificates are available. The 18-credit graduate certificate in museum studies is primarily for international museum professionals who wish to study museum administration, collections management, or exhibition development in the United States; this certificate is also available to U.S. students who hold at least a master's degree in an appropriate subject. The 12-credit graduate certificate in museum collections management and care is offered via distance education to qualified domestic applicants who have museum experience and staff-level access to a museum and its collection. Additional information can be obtained from the Museum Studies Program.

201 Introduction to Museum Studies: Staff

History and Philosophy of Museums (3)

Museums viewed from historical, philosophical, and practical perspectives.

Examination and comparison of types of collecting organizations. Analysis of contemporary studies on the status of museums and their public programs. (Fall)

202 Introduction to Museum Studies: Administration (3) Morris

Overall operation of the museum: legal status of the museum and its obligations to the public; governance, staffing, policymaking as a nonprofit organization. Theory applied to practical situations. (Spring)

- 203 **Fiscal Management of Nonprofit Organizations (3)** Staff
- Basic concepts of general accounting; fund accounting for nonprofit organizations; budgets and budget systems; use of the budget as a management tool; long-range planning; income sources; other financial management concepts. (Spring)
- 204 **Museum Administration: Leading Change in Museums (3)** Morris
- Leadership challenges and styles as they relate to organizational change efforts. Case studies of museums undergoing change; best practices in leadership at all levels of the museum. (Spring)
- 205 **Museum Administration: Managing People
and Managing Projects (3)** Morris
- Organizational development and modern management concepts as applied to museums. Managing people in the organization; the importance of project management systems to museum administration. (Fall)
- 215 **Collections Management: Legal and Ethical Issues (3)** Staff
- Establishing collections policies; laws, regulations, conventions, and codes that affect acquisitions, deaccessions, loans, and collection care; accountability; access problems. (Fall)
- 216 **Collections Management: Practical Applications (3)** Staff
- The implementation of collections policies: establishing and managing collections, management procedures and systems, documentation of collections, records preservation, collections access and storage, handling, packing and shipping, and inventory control. (Spring)
- 227 **Museum Evaluation: Exhibition and Programs (3)** Staff

Same as Educ 227.

- 232 **Museum Preventive Conservation I (3)** Staff
- Historical development of preventive conservation in museums, conservation ethics, team approaches to conservation, interactions of various materials with agents of deterioration. Basics of materials testing, preparation of condition reports, choosing museum storage and exhibition materials, and risk assessment. Same as Anth 232 and AH 286.
- 233 **Museum Preventive Conservation II (3)** Staff
- Practical applications of preventive conservation of materials, monitoring environmental conditions, conducting risk assessments, evaluation of exhibit and storage areas; developing plans, policies, and procedures for collections care; grant proposal preparation for collections care initiatives. Same as Anth 233 and AH 287.
- 270 **Museum Exhibition: Curatorial Research and Planning (3)** Rice
- Museum research from a curatorial point of view, with emphasis on exhibit theory and practice. Research techniques, information sources, script production. May be repeated for credit. (Fall)
- 271 **Museum Exhibition: Design Processes (3 or 6)** Staff
- The processes of research, conceptualization, planning, and evaluation from a designer's point of view. Focus is on individual projects with some group collaboration. The designer's vocabulary, visual thinking, design documentation, and specifications. (Fall and spring)
- 272 **Museum Exhibition: Script Writing (3)** Rice

Research techniques; information sources; script production from a content perspective. (Fall and spring)

287 **Museums and Technology** (3) Staff

Same as Educ 287.

291 **Museum Internship** (1 to 6) Staff

Individual work experience in museums of the Washington area and possibly elsewhere. Each student should make arrangements with the Museum Studies Program staff. Museum internships are supervised by one or more members of the cooperating museum staff in the areas of museum management, object care and conservation, and exhibiting. (Fall, spring, and summer)

295 **Directed Research** (3) Staff

Individual research on special topics in the museum field. Topics must be approved by the director of the Museum Studies Program. May be repeated for credit (Fall, spring, and summer)

297 **Special Topics** (3) Staff

May be repeated for credit provided the topic differs.

ORGANIZATIONAL SCIENCES AND COMMUNICATION

Professors C. Warren, L. Offermann

Associate Professors E.B. Davis, D.P. Costanza (*Chair*)

Assistant Professors J.C. Miller, N. Olsen, A.J. Critchfield, G. Debebe, M. Still

Professorial Lecturers S. Wehrenberg, E. Hoffman, J.C. Leon, A.J. Procopio, N. Pham, V.

Grady

The Department of Organizational Sciences and Communication offers interdisciplinary programs leading to the degree of Master of Arts in the field of organizational sciences with concentrations in human resources management and organizational management. The programs have been designed for public, private, and nonprofit sector professionals who wish to increase their managerial competence, enhance their leadership ability, and improve their career potential. The curricula provide knowledge and skills in the social and behavioral sciences. In addition, a graduate certificate in organizational management is offered.

Master of Arts in the field of organizational sciences with a concentration in human resources management—Prerequisite: a bachelor's degree with a *B* average from an accredited college or university.

Required: the general requirements stated under Columbian College of Arts and Sciences, including 36 credit hours of course work. There is no thesis requirement. All students must pass a Master's Comprehensive Examination. The following courses are required: OrSc 209, 212, 214, 222, 223, 248; Econ 219; Psyc 245; Stat 104.

Master of Arts in the field of organizational sciences with a concentration in organizational management—Prerequisite: a bachelor's degree with a *B* average from an accredited college or university.

Required: the general requirements stated under Columbian College of Arts and Sciences, including 36 credit hours of course work. There is no thesis requirement. All students must pass a Master's Comprehensive Examination. The following courses are required: OrSc 209, 216, 241, 242, 243; Econ 219; Psyc 245, 259; Stat 104.

The Doctor of Philosophy in the field of psychology with a concentration in industrial/organizational psychology is offered through the Department of Organizational Sciences and Communication.

ORGANIZATIONAL SCIENCES

209 Management Systems (3)

An overview of theoretical frameworks, evolution, concepts, and methods of complex organizational systems. Modern organization theory using systems thinking and concepts. Organizational and management systems paradigm shifts. Problem solving and decision making, stakeholder theory, organizational environments, organizational effectiveness.

212 Current Issues in Personnel Testing and Selection (3)

Psychometric, legal, and organizational issues in personnel employment testing and selection, reliability and validity of selection instruments, and the utility of selection systems. The legal environment, including test fairness in selection, adverse impact, and statistical models of test fairness and specific selection techniques. Prerequisite: Stat 104.

214 Personnel Training and Performance Appraisal Systems (3)

Management training programs and training evaluation techniques. Performance appraisal techniques, appraisal systems, relationship of rewards to performance and the appraisal interview. Training and rating systems that satisfy legal requirements and stimulate employee productivity.

216 Theories and Management of Planned Change (3)

A systems view of organizational change and development, including intervention strategies, data collection, diagnosis, and the integration and management of system-wide organizational change.

217 Productivity and Human Performance (3)

Definitions and measurement of individual, team, and organizational productivity, effectiveness, and efficiency. Models for the analysis of organizational and individual productivity and productivity growth in industrialized nations. Techniques for increasing productivity.

222 Theory and Practice of Compensation Management (3)

Analysis of contemporary compensation systems from both theoretical and practical perspectives, including the latest decisions of courts and regulatory agencies.

Examination of motivational theories of pay, determinants and effects of salary structures on performance, incentive plans, performance-based compensation, and managerial compensation systems.

223 Collective Bargaining (3)

Analysis of federal and state employee relations laws and regulations. Topics include the bargaining environment, wage and benefit issues in arbitration, arbitration of grievances, employee relations in non-union organizations, and behavioral theories of labor negotiations.

241 Strategic Management and Policy Formation (3)

Processes and theories of strategic management in the profit and not-for-profit sectors. Analysis of behavioral, sociopolitical, and economic forces underlying strategy formulation. Issues of strategic competitive advantage; corporate

diversification; multinational corporations; evaluation and choice; and implementation of functional and corporate strategies.

242 Organizational Communication and Conflict Management (3)

Theories and models of communications and communication media; barriers to effective communication and techniques for improving interpersonal, group, and organizational communications. Sources of conflict in organizations at the individual, group, and organizational levels; methods of conflict management and resolution.

243 Seminar: Leadership in Complex Organizations (3)

The view of leadership taken in this seminar extends theories beyond the interpersonal, near-immediate time frame toward an organizational perspective in which cause-and-effect linkages are traced. The leadership role as an attribute of a system. How effective leaders reduce uncertainty through appropriate adaptive change.

246 Comparative Management (3)

International dimensions of management over a broad spectrum of topics, including cross-national transfer and management practices in a global economy; cross-cultural interaction; business–government relations; expatriation and repatriation processes; international strategic management; technology transfer; globalization of human resources management.

248 Strategic Human Resource Planning (3)

Overview of the principles of human resource planning. Model for determining human resource requirements, including forecasting, goal setting, human resource auditing, and environmental scanning. Analysis of the interfaces between human

resource planning and personnel selection, job design, training, compensation, and related functions.

249 Human Resource Information Systems (3)

Analysis of information systems designed to support planning, administration, decision making, and control activities of human resource management. Examination of applications such as personnel selection and performance appraisal systems, payroll and benefit management, and career pathing.

250 Leadership Coaching: Principles and Practices (3)

An introduction to leadership coaching, including behavioral sciences roots: communication and conflict resolution skills, motivation, personality and performance assessments. Coaching vs. related practice areas; business coaching vs. personal coaching. Professional and ethical standards.

251 Team Coaching and Facilitation (3)

Application of the fundamentals and governing values of leadership coaching to the development of productive work groups and communities. The art and practice of facilitation as applied to team learning and the encouragement of breakthrough thinking and team problem solving. Prerequisite: OrSc 242, 250.

261 Research Methods in Organizational Sciences (3)

Fundamentals of qualitative, correlational, quasi-experimental, and experimental research designs. Defining a research question, designing a research study, conducting and interpreting statistical analyses, and communicating research results.

295 Directed Research (arr.)

Supervised research in selected fields within organizational sciences. Admission by prior permission of faculty advisor and instructor.

297 Special Topics (3)

Special topics in human resource strategic planning, computer-based learning, human-computer interaction, management information technology, knowledge management, coaching, and organizational design.

298 Directed Readings (arr.)

Supervised readings in selected fields within organizational sciences. Admission by prior permission of faculty advisor and instructor.

PHARMACOLOGY

The Department of Pharmacology and Physiology offers the courses listed below in support of basic science programs offered by Columbian College of Arts and Sciences. See Molecular Medicine for research fields in pharmacology.

205 Pharmacology (3)

Perry

Basic principles of pharmacology, including receptor mechanisms, membrane phenomena, drug distribution and metabolism and pharmacokinetics. Lectures, laboratories, and tutorials on the interactions of drugs and biological systems as a basis for rational disease therapy. Prerequisite: BmSc 210, 211, 212; or permission of instructor. (Fall)

206 Advanced Pharmacology (3)

Perry

Lectures on the interactions of drugs and specific organ systems. Tutorials on current research in pharmacology and toxicology. Prerequisite: Phar 205. (Spring)

PHILOSOPHY

University Professor P.J. Caws

Professors W.B. Griffith, R.P. Churchill, D. DeGrazia (*Chair*), G. Weiss

Assistant Professors M. Friend, E.J. Saidel, J.C. Brand-Ballard, T. Zawidzki, G. Van Cleemput

Master of Arts in the field of public policy with a concentration in philosophy and social policy—An interdisciplinary program that brings the normative, historical, and analytical-logical skills of philosophical inquiry to bear upon contemporary problems of social policy. The program is affiliated with the School of Public Policy and Public Administration. Prerequisite: a bachelor's degree from an accredited college or university. Students are expected to have completed the prerequisites to graduate courses.

Required: the general requirements stated under Columbian College of Arts and Sciences. Two options are available at the discretion of the faculty: (1) a minimum of 24 credit hours of approved graduate course work plus the successful completion of a thesis (Phil 299–300), or (2) a minimum of 36 credit hours of graduate course work that does not include a thesis. All students are required to take four courses selected from Phil 230, 231, 238, 242, 250, 255, 262, 281; and, for the public policy core, four courses, one from each of the following groups: (a) PSc 229, 212, 224; (b) Econ 217, 221, 237, 248; (c) PSc 203, WStu 240, E&RP 210, Hist 214; (d) PAd 296 or equivalent as approved by the advisor. Electives may focus on a particular policy area (e.g., biomedical/health care, urban/welfare, or environmental policy), or may explore varied approaches and policy issues. Each candidate must pass a Master's Comprehensive Examination based on the particular interdisciplinary composition of the student's program of study. Prospective candidates should consult the program director.

With permission, a limited number of 100-level courses in the department may be taken for graduate credit; additional course work is required. See the Undergraduate Programs Bulletin for course listings.

201–2 **Readings and Research (3–3)** Griffith and Staff

Advanced readings and reports. Investigation of special problems. (Academic year)

230 **Ethical Issues in Policy Arguments (3)** Griffith

Critical analysis of ethical foundations of public policy arguments, e.g., about protection of the environment or health and safety, equality of opportunity. Case studies of appeals to “welfare improvements,” to norms of duty, to “the social contract,” and to rights–claims. Attention to historical contexts and biases. Open to undergraduates only with permission of instructor. (Fall)

231 **Economic Justice (3)** Griffith

Ethical and economic analysis of equity and efficiency of current U.S. income distribution patterns. Theories of justice; economic theories of distribution; assessment of redistribution policies. Open to undergraduates only with permission of instructor. (Spring)

238 **Feminist Ethics and Policy Implications (3)** Weiss

Feminist critiques of traditional ethical reasoning; alternative feminist ethical frameworks examined and applied to contemporary social problems (e.g., reproductive technology, genetic engineering). Prerequisite: Phil 125 or 131 or permission of instructor. Same as WStu 238. (Spring, alternate years)

242 **Philosophy, Law, and Social Policy (3)** Brand-Ballard

Examination of basic questions about the role law can and should play in society.

Topics include the nature and basis of rights; theories of constitutional interpretation; proposals for legal and political reform of Western liberal democracy. (Spring)

250 **Topics in Health Policy** (3) DeGrazia

Topics in health policy from the perspective of philosophical ethics, including human and animal research, the enhancement of human traits, justice and health care allocation. (Spring)

262 **Normative Issues in Foreign Policy** (3) Churchill

Selected issues on foreign policy from a normative perspective; emphasis on human rights, economic globalization, global poverty, sustainable development, and the ethics of military intervention.

281 **Environmental Philosophy and Policy** (3) Churchill, Brand-Ballard

Development of philosophical frameworks for analyzing and appraising a wide range of environmental issues and modes of analysis. Attention to both classical problems (pollution, biodiversity) and the new “sustainable economy/ ecology” paradigm shift, and to both microeconomic and biocentric modes of analysis and argument.

299–300 **Thesis Research** (3–3) Staff

778 **Left and Right in Philosophy and Politics** (3) Caws

See the University Professors course listing.

PHYSICS

Professors D.R. Lehman, B.L. Berman, L.C. Maximon (*Research*), W.C. Parke (*Interim Chair*),

W.J. Briscoe, C. Bennhold, M.E. Reeves

Associate Professors H. Haberzettl, K.S. Dhuga, G. Feldman, I. Strakovsky (*Research*), R.L.

Workman (*Research*), A. Eskandarian, F.X. Lee, A. Opper, C. Zeng

Assistant Professors W. Peng, H. Griesshammer, A. Nijdam (*Research*), A.M. Micherdzinska

(*Research*), G. Wang (*Research*)

Professorial Lecturers B. Ratnam, J.T. Broach, M.F. Corcoran

Master of Science in the field of physics—Prerequisite: a bachelor's degree with a major in physics at this University, or an equivalent degree.

Required: the general requirements stated under Columbian College of Arts and Sciences, and 36 credit hours of graduate course work, including Phys 209, 211, 213, 221, 224, 225, 250, 281, and either two courses chosen from Phys 231, 233, 234, 243 or, for the thesis option, Phys 299–300.

Doctor of Philosophy in the field of physics—Required: the general requirements stated under Columbian College of Arts and Sciences, including the following required courses: Phys 209, 211, 213–14, 221–22, 224, 225, 231, 233 or 243, and 250.

Research fields: nuclear physics—experimental and theoretical studies on the structure, electromagnetic and weak and strong interactions, and scattering of few-body systems at low and intermediate energies; biophysics and condensed-matter physics—experimental studies using scanning probe-based near-field microscopy, statistical and computational biophysics in protein design, bionetworks and evolution; theoretical and observational astrophysics, interdisciplinary physics, including coherent radiation physics, and applied physics, including medical physics.

With permission, a limited number of 100-level courses in the department may be taken for graduate credit; additional course work is required. See the Undergraduate Programs Bulletin for course listings.

Departmental prerequisite: Consent of a departmental graduate advisor is required for admission to all 200-level courses in physics.

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| 209 | Mathematical Methods | Griesshammer, Workman, Lee |
| | of Theoretical Physics (4) | |
| | Calculus of variations. Group theory. Tensor calculus. Hilbert spaces. Operator theory. Orthogonal function expansions. Partial differential equations. Green's function method. Integral equations. Complex variables. Analytic functions. (Fall) | |
| 211 | Advanced Mechanics (4) | Parke, Haberzettl |
| | Analytic methods of mechanics as a basis for modern theory; variational principles, Lagrange's equations, Hamiltonian formulation, canonical transformations, classical perturbation theory, non-linear systems, special relativity. (Fall) | |
| 213 | Electrodynamics and Classical Field Theory (4) | Griesshammer, Lee |
| | Principles of electrostatics and magnetostatics and classical field theory. Maxwell's equations from least-action and symmetry principles, time-varying fields, and plane-wave propagation. Radiating systems and scattering of radiation, including multipole fields. Dynamics of relativistic particles and radiation from moving charges. Microscopic parameters and macroscopic observables. (Spring) | |
| 221–22 | Quantum Mechanics (4–4) | Griesshammer, Lee, Haberzettl |
| | Principles. Representations. Transformation theory. Schrödinger and Heisenberg pictures. Angular momentum algebra. Perturbation theory. Scattering theory. Relativistic quantum mechanics. Introduction to relativistic quantum field theory. First-order electromagnetic processes. Many-body theory. (Academic year) | |
| 224 | Statistical Mechanics (4) | Zeng, Peng |

- Classical and quantum statistics. Statistical entropy, fluctuations. Ensemble theory. Partition functions. Density matrices. Applications to magnetic systems, ideal Fermi–Dirac and Bose–Einstein systems, blackbody radiation, phonons. Renormalization group. Phase transitions and critical phenomena. (Fall)
- 225 **Graduate Laboratory (3)** Feldman, Reeves
Selected experiments on nuclear and solid-state physics. Laboratory fee.
(Fall and spring)
- 231 **Quantum Field Theory I (3)** Griesshammer, Parke
Local field theory and symmetry principles, field quantization, perturbation calculations, first-order electromagnetic and weak processes, divergence difficulties.
(Fall)
- 232 **Quantum Field Theory II (3)** Griesshammer, Parke
Covariant presentation of general theory of quantized fields, path-history quantization, theory of the S-matrix, dispersion relations, and renormalization program. (Spring)
- 233 **Nuclear Physics (3)** Briscoe, Haberzettl, Griesshammer
Nuclear interactions, nuclear models, theory of nuclear reactions, pion physics, weak interactions, and electromagnetic interactions. (Fall and spring)
- 243 **Solid-State Physics: Structure and Binding (3)** Reeves, Zeng
Crystal structure and binding; the reciprocal lattice, X-ray diffraction. Elastic properties, thermal, electric, optical and magnetic properties of solids, dislocations, and other defects. (Fall)
- 250 **Communications in Physics (0 to 3)** Staff

Student presentations on advanced topics in physics.

- 251 **Selected Topics in Theoretical Nuclear Physics (3)** Haberzettl, Bennhold, Lee, Griesshammer

May be repeated once for credit with permission of graduate advisor.

- 252 **Selected Topics in Experimental Nuclear Physics (3)** Berman, Briscoe, Feldman, Opper

May be repeated once for credit with permission of graduate advisor.

- 253 **Selected Topics in Theoretical Condensed-Matter Physics (3)** Zeng

May be repeated once for credit with permission of graduate advisor.

- 254 **Selected Topics in Experimental Condensed-Matter Physics (3)** Reeves

May be repeated once for credit with permission of graduate advisor.

- 255 **Selected Topics in Astrophysics (3)** Dhuga, Maximon, Parke

May be repeated once for credit with permission of graduate advisor.

- 281–83 **Computational Physics I–III (1 each)** Griesshammer, Haberzettl, Lee, Peng, Zeng

Phys 281 is taken in conjunction with Phys 209 and 211; Phys 282, with Phys 213 and 221; Phys 282, with Phys 222 and 224.

- 291 **Seminar (1)** Staff

Lectures on current topics in physics. May be repeated twice for credit.

- 299–300 **Thesis Research (3–3)** Staff

- 398 **Advanced Reading and Research (arr.)** Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated once for credit.

399 **Dissertation Research** (arr.)

Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit.

POLITICAL MANAGEMENT

Professors F.C. Arterton (*Dean*), D.W. Johnson

Associate Professors C.B. Cushman (*Associate Dean*), L. Matos (*Research*), S. Billet

Assistant Professor G. Lebel

Professorial Lecturers M. Edwards, J. Hobson, D. Anderson, M. Cornfield, P. Fenn, M. Braden,

R. Faucheux, W. Greener, E. Grefe, B. Tringali, K. Schafer, D. McGroarty, R. Beckel, D.

Cantor, C. Darr, R. Fullinwider, D. Lathrop, J.M. Parker, R. Smith, J. Weinberg, R. Whitlock

The Graduate School of Political Management, through the College of Professional Studies, offers the Master of Professional Studies in the fields of political management and legislative affairs. Both programs have a prerequisite of a bachelor's degree with a *B* average from an accredited college or university and are subject to the CPS regulations that appear under the respective programs at www.cps.gwu.edu. In addition to these degree programs, graduate certificate programs are offered in political management, community advocacy, and in PACs and political management.

Master of Professional Studies in the field of political management—The 36-credit program requires PMgt 201, 202, 203, 204, 205, and 206 (which must be completed in the first eight courses taken), plus three PMgt courses in the chosen area of focus—advocacy politics (PMgt 230 plus two from PMgt 231–248); electoral politics (PMgt 250 and 251 plus one from PMgt 228 and 252–260); and advanced political skills (any three from PMgt 211–229). All students complete a 400-hour internship of supervised political management activity. Those in the thesis program take PMgt 299–300; those in the nonthesis program take PMgt 295.

Master of Professional Studies in the field of legislative affairs—The 33-credit program requires PSc 201 or 203, 218, 222, and 229, plus at least two courses chosen from each of the following groups: American political process—PSc 215, 216, 219, 220, 221, 228, 246, 286; PMgt 267. Public policy analysis—PSc 212, 224, 249, 250; PMgt 266; WStu 240. The program may be completed with or without a thesis. With prior approval of the academic advisor, students may take up to three courses in related disciplines. All students must pass a Master's Comprehensive Examination.

201 **Fundamentals of Political Management (3)** Cushman, Johnson

Introduction to theory, practice, and development of political management. Political developments since 1945 and their impact on the development of political management as a field and profession. Public policy roles of political managers. Political strategy for the political manager. (Fall and spring)

202 **Research Methods for Political Managers (3)** Wiley

Use of quantitative information in politics. Research design, statistical association and causal reasoning, types of variables, hypothesis testing and confidence, and introduction to regression analysis. How to be an informed user of quantitative data for political management and policymaking issues. (Fall and spring)

203 **Communications Elements (3)** Cornfield and Staff

The basic political communications model, including communications strategy, political research (targeted audiences, polling, and candidate research), and message discipline. Internet usage, press releases, issue briefs, direct mail letters, fact sheets, talking points, congressional testimony, public addresses, and television and radio commercials. (Fall and spring)

- 204 **Communications Strategy (3)** Cornfield and Staff
- Formulation of political communications strategies. Elements necessary to create, introduce, and maintain an effective political profile in issue advocacy campaigns, candidate elections, and legislative advocacy campaigns. Application of principles of research, advertising, and marketing to the political landscape. Prerequisite: PMgt 203. (Spring and summer)
- 205 **Ethics for Political Managers (3)** Fullinwider, Anderson, Darr
- Professional responsibilities of political managers. Introduction to political leadership as ethics in action, starting with concrete situations and reasoning back to constitutional and philosophical principles. Laws and regulations that affect political activity (conflict of interest, disclosure, lobbying registration, campaign finance, fraud) (Fall, spring, and summer)
- 206 **Political Leadership (3)** Schafer
- Theory and practice of political leadership. Introduction to leadership theory. Application through self-assessment of leadership skills and potential. Communications practices for exercising political leadership. (Fall, spring, and summer)
- 211 **Polling (3)** Tringali
- Survey research uses in campaigns. Major objectives of surveys, designing and drawing samples, constructing and pretesting questionnaires, modes of interviewing, financial implications, practical problems in selecting and monitoring polling organizations, and interpretation of survey data. (Summer)
- 212 **Qualitative Research (3)** Tringali

- Uses and usefulness of focus groups and small-sample interviews; procedures involved in these techniques; implications of psychological and sociological theory; relationship of qualitative and quantitative research. (Spring)
- 214 **Public Opinion Dynamics (3)** Cantor
- Processes by which citizens make decisions about political issues and consider the range of methods for influencing those decisions. Public opinion polling, voter behavior studies, communications, media studies, and attitudinal change. (Summer)
- 215 **Managing Online Campaigns (3)** Staff
- Building and managing a web campaign in electoral or advocacy arena; overseeing outreach in online communities. Topics include the technical (building a backend system, designing a budget, blogging, social networking) and the practical (working with web vendors, online fundraising, get-out-the-vote, issues management). Studio fee. (Spring)
- 216 **Speechwriting (3)** McGroarty
- Analysis and techniques of effective speechwriting and presentations for public officials and candidates; emphasis on speechwriting for campaigns and public policy forums. (Fall and summer)
- 217 **Political Management and Media (3)** Greener, Arterton
- Organization, practices, and norms of the major media; media coverage of public officials, political campaigns, legislative battles, interest groups, and issues of public policy. Formulation of strategies for getting favorable news coverage for the issue or candidate and for ending a media crisis. Studio fee. (Spring)
- 218 **Videography and Political Marketing (3)** Staff

- Political marketing and messaging online, including technical projects, such as online banner ads and web videos; practical projects, such as search-engine marketing plan and blogger outreach; and analytic projects, such as web metrics, cost-per-click, reach, and persuasion. Studio fee. (Fall)
- 219 **Microtargeting** (3) Staff
- Use of technology for microtargeting and analytics. The theory, mathematics, and behavioral science behind microtargeting. Data collection and analysis; database construction; practical sources and uses of data in mobilization, messaging, and fundraising; privacy and security. Studio fee. Prerequisite: PMgt 202. (Summer)
- 220 **Fundraising** (3) Staff
- The raising and spending of money in political campaigns, referenda contests, issue politics, and lobbying efforts. Budgeting, control of expenditures, accounting procedures, and general strategies for fundraising. (Summer)
- 221 **Fundraising for Organizations** (3) Staff
- Advanced business and techniques of fundraising for charitable, trade association, semiprivate, and public institutions. Topics include long-range financial stability for organizations, including membership strategies, new technology (Internet and mobile), direct mail, telemarketing, and special events. (Spring)
- 222 **Party Fundraising** (3) Staff
- Advanced analysis of how political parties raise money, with emphasis on new technology applications. Historical overview of political fundraising, campaign finance reform. Components of a political party fundraising plan and how to prepare a plan. (Fall)

- 225 **Leadership Theory** (3) Schafer
Advanced study of leadership as applied to the political realm, compared to corporate and nonprofit sectors. Theories of leadership, with particular attention to balancing governing (policy) with electoral support (politics). (Spring)
- 227 **Women in Politics** (3) Shafer, Grosfeld
Application of political management principles for women in the political arena. Topics include institutional and interpersonal opportunities and barriers for women, impact of politically active women on public policy; gender gap in voting behavior and public opinion; media portrayal of women candidates and public officials. (Fall)
- 228 **Law and the Political Process** (3) Braden
Federal and state laws and regulations governing recognition of political parties and political organizations, campaign finance, political broadcasting and cablecasting, lobbying registration. Ballot access and voter registration. Ethics in public service. (Summer)
- 229 **Managing Political Organizations** (3) Staff
How to manage a candidate, campaign, team, and other stakeholders. Philosophy and framework for organizational management in the political arena. (Fall and spring)
- 230 **Issues Management** (3) Edwards
Management of public policy issues, rise of referenda and citizen initiatives, proliferation of issue-oriented campaigns directed at the grassroots. How individuals and interest groups participate in the issue advocacy process. The evolving role of political and campaign managers in issue campaigns. (Fall and spring)

- 231 **Lobbying (3)** Hobson
How lobbying and organized advocacy fit into the American political process.
Development and implementation of advocacy strategies. Lobbying by business, labor, public interest groups, and other nonprofit organizations. Lobbying within and among various branches of government. (Fall and spring)
- 232 **Lobbying the Budget Process (3)** Edwards
Politics of the budget process, using case studies from recent federal budget cycles. Formal and informal mechanisms of budgeting; lobbying strategies employed by private and public organizations seeking to influence budgetary decision making; negotiations within and between executive agencies. Prerequisite: PMgt 231. (Summer)
- 233 **Grassroots Politics (3)** Grefe
Use of microtargeting and database-layering technology to identify potential advocates. Motivational techniques to mobilize volunteers for political campaigns, lobbying efforts, and community advocacy. Techniques used by grassroots organizers to help corporations, unions, civic and nonprofit organizations, and special interest groups achieve strategic goals. (Spring)
- 234 **International Lobbying (3)** Billet
Examination of the current state of international lobbying and analysis of strategic models. (Spring)
- 235 **Strategic Management of Issues (3)** Grefe
Case studies of advocacy efforts in major current policy questions. Development of strategy and message, integrating research and technology for advocacy campaigns.

(Fall and summer)

- 236 **Corporate Public Affairs (3)** Smith
Exploration of major functional areas in corporate public affairs, with focus on political and policy dynamics. (Fall)
- 241 **Crisis Management (3)** Edwards
Management of crisis situations and defining moments in electoral, legislative, and public policy campaigns. Simulation exercises and recent case studies illustrate both theoretical and practical aspects of crisis management. (Fall)
- 244–45 **Lobbying the European Union I–II (3–3)** Billet
PMgt 244: Intensive six-week program exploring the rules, tactics, and techniques of lobbying in the European Union. PMgt 245: Intensive two-week practicum applying lessons learned in PMgt 244; held at the College of Europe and EU headquarters in Belgium. (Summer)
- 250 **Campaign Strategy (3)** Lebel, Fauchaux
Orientation to the basic systems that must be managed to produce electoral victory. The campaign plan and campaign budget as the foundation for management of campaigns. Focus on development of a campaign plan. (Fall, spring, and summer)
- 251 **Campaign Organization and Execution (3)** Lebel
Choices facing the campaign manager in staffing a campaign and executing the campaign plan: candidate assessment, fundraising, geographic and demographic targeting, field organization, canvassing, phone banks and get-out-the-vote, press operations, financial control, and relations with the party and interest groups. Prerequisite: PMgt 250. (Fall and spring)

- 252 **Campaign Advertising and Promotion (3)** Fenn
- Strategies and techniques for using the various media in political campaigns, with emphasis on the use of television. Impact and potential uses of various media; development of campaign messages; production, timing, and placement of television advertising. Students design print ads and brochures and produce a 30-second television spot. Studio fee. Prerequisite: PMgt 251. (Spring)
- 253 **Presidential Campaigns (3)** Faucheux
- Trends and innovations in presidential campaign strategy: use of new technology, campaign organization, fundraising, primaries and caucuses, delegation selection rules, party conventions, national and state party organizations, and the general election. (Summer)
- 256 **International Political Consulting (3)** Johnson
- How consultants help to professionalize elections and campaign techniques around the world. Techniques and practices for the international consulting business. (Spring)
- 257 **State Government and Politics (3)** Staff
- Intersection of legislating and campaigning at the state and local levels. Methods and techniques for advocacy in state capitals. (Spring)
- 258 **State and Local Campaigns (3)** Staff
- Application of campaign strategy and management principles to electoral races at the state/local levels. Particular attention to staffing, budgeting, and strategic challenges for state/local candidates. (Spring)
- 260 **Running for Office (3)** Faucheux

- Electoral politics from the perspective of the candidate, strategic and personal factors involved in the decision to run, consequences of victory or defeat. (Summer)
- 265 **Special Topics (3)** Staff
Topic to be announced in the Schedule of Classes.
- 266 **Budgetary Policy (3)** Staff
Analysis of U.S. monetary and fiscal policy. Off-campus only. (Spring)
- 267 **Budgetary Politics (3)** Staff
Examination of federal budget policymaking and politics. Off-campus only. (Fall)
- 268 **PACs and Congress (3)** Staff
Political action committees in the United States in the context of wider arenas of campaign finance, elections, and issue management.
- 290 **Independent Study (3 to 6)** Staff
- 295 **Advanced Problems and Strategy (3)** Arterton
Capstone seminar that integrates research skills and political techniques required to define political objectives and develop the appropriate strategies to accomplish such objectives. Students enroll in this course toward the end of their program. (Fall, spring, and summer)
- 298 **Graduate Internship in Political Management (0)**
- 299–300 **Thesis Research (3–3)** Staff
Master's degree candidates must apply to the program committee for thesis approval and have completed 24 credit hours with a 3.3 GPA.

POLITICAL PSYCHOLOGY

Professor J.M. Post

The Elliott School of International Affairs offers a course sequence (which may lead to a graduate certificate) in political psychology.

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|-----|---|-------|
| 201 | Fundamentals of Political Psychology (3) | Post |
| | <p>A review of the interdisciplinary field of political psychology; examination of psychological influences on political behavior at the level of the individual and small group; the psychology of leader–follower relationships; crisis decision making.</p> <p>(Fall)</p> | |
| 202 | Political Psychology Research Methods (3) | Staff |
| | <p>Major research methods of political psychology, using classic articles in the field.</p> <p>Both quantitative methods, such as survey research and content analysis, and qualitative methods, such as personality profiling and comparative case studies, are considered. Prerequisite: PPsy 201. (Fall)</p> | |
| 203 | Public Opinion and Political Psychology (3) | Staff |
| | <p>Same as PSc 220.</p> | |
| 205 | Political Violence and Terrorism (3) | Post |
| | <p>The origins and the sociopolitical and behavioral dynamics of political violence and terrorism. Major types of terrorism are differentiated. Implications for antiterrorist policy. The psychology of hostages. (Spring)</p> | |
| 291 | Applied Political Psychology (3) | Post |
| | <p>Seminar and practicum in applications of political psychology. Prerequisite: PPsy 201. (As arranged)</p> | |
| 295 | Independent Study and Research (1 to 3) | Post |

Supervised research in a special topic in political psychology. Preparation of major research paper. Prerequisite: PPsy 201, 202. (As arranged)

POLITICAL SCIENCE

University Professors J.N. Rosenau, H. Harding

Professors B. Reich, H.R. Nau, J.B. Manheim, C. McClintock, L. Sigelman, M.J. Sodaro, S.L.

Wolchik, D. Shambaugh, C.J. Deering, H.B. Feigenbaum, N.J. Brown, H.L. Wolman, F.

Maltzman (*Chair*), M. Finnemore, J. Goldgeier, S.K. Sell, B. Dickson, P. Wahlbeck, S. Binder, M.E. Brown

Associate Professors J.H. Lebovic, R.P. Stoker, A. Bowie, M.M. Mochizuki, S.J. Balla, S.

Wiley, I. Creppell, M. Lynch, K.J. Morgan, H.E. Hale

Assistant Professors W.J. Winstead, C. Rector, S. Kelts, E.D. Lawrence, G.S. Lambright, H.

Farrell, J.M. Sides, E.J. Teitelbaum, D.K. Park, R.F. Adcock, E. Saunders, J.K. Jung, L.A.

Fujii

Instructor H. Schmidt

Master of Arts in the field of political science—Prerequisite: a bachelor's degree from an accredited college or university, or an equivalent degree, and high undergraduate scholastic standing.

Required: The general requirements stated under Columbian College of Arts and Sciences and a research tool, which may be reading knowledge of a modern foreign language, a specified level of knowledge in statistics, or two graduate-level courses in a cognate discipline. Students must take at least six courses selected according to departmental guidelines in their chosen field and pass a comprehensive exam in that field. Four fields are available: American politics; international relations; comparative politics; and public policy. Students are required to take at

least two courses outside of their primary field. Students may elect one of the following programs: (1) 30 credit hours of graduate course work, including PSc 299–300, and the satisfactory completion of a master’s thesis; or (2) 33 credit hours of graduate course work without a thesis.

Doctor of Philosophy in the field of political science—Students of outstanding ability are admitted to the doctoral program upon recommendation of a departmental graduate committee and the concurrence of Columbian College.

Required: The general requirements stated under Columbian College of Arts and Sciences, two research tools, two comprehensive exams covering a primary and supporting field, and a dissertation demonstrating the capacity to undertake original and significant research. The research tools may be selected from reading knowledge of a modern foreign language, a specified level of knowledge in statistics, or two graduate-level courses in a cognate discipline. Students prepare for the comprehensive exams by taking at least six courses in their primary field and at least four courses in their supporting field, selected according to departmental guidelines. Three primary fields are available: American politics; international relations; and comparative politics. In addition, political theory, public policy, and research methodology are available as supporting fields. Petitions for a self-designed minor field composed primarily of courses not offered by the established fields can be jointly proposed by students and faculty. All students must complete a sequence of courses in research methodology comprising PSc 201 and either PSc 202 or 209. Students may opt to take all three. Completion of PSc 202 with a grade of *B* or higher will be taken as evidence that a student has achieved the level of knowledge in statistics necessary to satisfy one of the research tool requirements as outlined above. Comprehensive examinations are given three times per year. Students may take both their

primary and supporting field examinations during the same testing period, or they may take them in successive semesters. The examination in the primary field entails both a written and oral component.

A recommendation to the dean for admission to candidacy, or the dissertation research stage, will be considered upon satisfactory completion of all course work, tool requirements, and field examinations. Students must pass their primary field examination with a satisfactory pass or higher and must pass their supporting field examination with a bare pass or higher in order to be considered eligible for promotion to candidacy. Admission to candidacy is permitted only if the student's performance on the examinations and in the course work gives a good indication of success in the second unit. Passing the field examinations does not in itself ensure admission to candidacy. Following advancement to candidacy, the student must complete and defend a dissertation prospectus and a dissertation.

The dissertation prospectus must outline the central research question(s), relate the proposed research to the existing literature, detail a research methodology, and explain the nature of the original contribution that the completed project will provide. The prospectus must be presented and defended in an open forum, which all faculty and doctoral students are invited to attend. The full dissertation must be similarly defended.

A dual degree program enables students to earn the Master of Public Policy along with the Ph.D. in the field of political science.

With permission, a limited number of 100-level courses in the department may be taken for graduate credit; additional course work is required. See the Undergraduate Programs Bulletin for course listings.

Statistical foundations of empirical political analysis and computer applications.

Basic probability theory, exploratory and descriptive data analysis, statistical inference, and introduction to linear regression. Laboratory fee.

202 **Empirical Political Analysis (3)** Wahlbeck, Lawrence, Park

Techniques of social science data analysis. Model building, estimation, and interpretation. Linear models and extensions. Introduction to discrete choice models.

Prerequisite: PSc 201 or permission of instructor. Laboratory fee.

203 **Approaches to Public Policy Analysis (3)** Stoker, Balla

Primarily for master's students. Empirical and normative foundations of systematic policy analysis: concepts, theories, models, issues, strengths, limitations, and uses and misuses in the policy process.

205 **Readings in Political Theory (3)** Creppell, Kelts, Adcock

Selected major works, both ancient and modern, that illuminate basic problems and questions of political theory.

206 **Topics in Political Theory (3)** Creppell, Kelts, Adcock

Advanced readings and group discussions. Analysis and interpretation of selected concepts and schools of thought.

207 **Modern Political Thought and Ideologies (3)** Creppell, Adcock

Analysis of some main currents in modern political thought and ideologies.

209 **Systematic Inquiry and Research Design (3)** Deering, Adcock

Study design, data collection, and models of analysis in political science.

210 **American Political Process (3)** Deering, Maltzman

A survey of American political institutions, processes, and behavior.

- 211 **Urban Politics (3)** Wolman
- Comparative analysis of the context, institutions, processes, and policies of urban political systems.
- 212 **Urban Policy Problems (3)** Wolman
- Analysis of public policy issues confronting urban governments; emphasis on the theoretical roots and empirical impact of past and present programs in such areas as housing, education, poverty, and crime.
- 213 **Judicial Politics (3)** Wahlbeck
- Introduction to the literature of judicial process and behavior studies; specific focus on selected topics. Emphasis on the major subfields of law, courts, and judicial process.
- 215 **Judicial Policymaking (3)** Wahlbeck
- Role of the judiciary in policy formulation; emphasis on the U.S. Supreme Court and civil liberties issues.
- 216 **American Presidency (3)** Maltzman
- Personalized and institutionalized aspects of the presidency, with particular emphasis on the politics of contemporary policymaking.
- 217 **Executive Branch Politics (3)** Balla
- Structure and operation of governmental bureaucracy with particular emphasis on the politics of formulating and implementing public policy.
- 218 **Legislative Politics (3)** Deering, Maltzman, Binder

- Theory, structure, and process of the U.S. Congress, with emphasis on member–constituency relations, individual and collective decision making, party and committee activities, executive–legislative relations, and interest-group activities.
- 219 **Political Parties and Elections (3)** Binder
Nature and functions of American political parties: organizational status, nominating and electoral politics, and role in governing.
- 220 **Public Opinion and Political Psychology (3)** Sides
Sources and dynamics of public opinion and political socialization. Same as PPSy 203.
- 221 **Interest-Group Politics (3)** Deering
Theory, structure, and activities of interest groups in American politics.
- 222 **Executive–Legislative Relations (3)** Staff
Political and institutional relationships between the executive and legislative branches of the federal government. Offered off campus only.
- 224 **Domestic Policy Analysis—Selected Topics (3)** Balla
Analysis of U.S. policy toward selected domestic problems.
- 226 **Politics and Organizations (3)** Finnemore
Theoretical approaches to understanding organizational behavior and change; applications to specific political problems in U.S., international, and comparative politics.
- 228 **Media and Politics (3)** Sides
Role of the media in American politics, with emphasis on television news coverage, political debates, political advertising, and their impact on the electorate.

- 229 **Politics and Public Policy (3)** Stoker, Balla, Wolman, Lawrence
Examination of political processes that influence policy formulation, policy implementation, and the uses of policy analysis. Same as PPol 201.
- 230 **Comparative Government and Politics (3)** McClintock, Dickson
Open to Elliott School students only. Examination of basic approaches to comparative politics.
- 232 **Communism and Democratization (3)** Sodaro
Comparative analysis of transitions to democracy in communist and postcommunist systems, with applications of democratic theory.
- 233 **Comparative Politics of Russia and Eurasia (3)** Hale
Comparative analysis of politics in the post-Soviet region. Theoretical and methodological approaches to understanding important issues, frequently including democracy/autocracy, ethnic conflict, political economy, center– periphery relations, and state building.
- 234 **Democracy and Democratization
in Comparative Perspective (3)** N. Brown, Dickson, McClintock
Theoretical approaches to processes of democratization. Evaluation of cultural, economic, institutional, and international-actor approaches. Case analysis of recently transitioned or transitioning nations. Primarily for Ph.D. students in political science.
- 235 **The Politics of Industrialization (3)** Bowie, Lambright
Comparative analysis of politics as it has affected and been affected by the processes of industrialization, with special attention to cross-regional comparison of Latin America and East and Southeast Asia.

- 236 **The Political Economy of Developing Areas (3)** Bowie
Comparative analysis of how development problems have been defined from both political and economic perspectives and the solutions proposed by outsiders and insiders. Emphasis on the rise, demise, and recovery of development orthodoxies.
- 237 **Theories of Political Development (3)** Feigenbaum
Examination of how and why political systems develop the way they do. Why do some countries develop into democracies, while others become authoritarian? How do class conflict, the nature of the elite, and the political culture affect the development of political institutions?
- 238 **U.S. Foreign Economic Policy (3)** Nau
Exploration of ideas and issues involved in U.S. foreign economic policy, including relationship of economic and security issues, interdependence, protectionism, role of the dollar, industrial policy, and the debt crisis.
- 239 **International Political Economy (3)** Sell, Nau
Research seminar exploring alternative theoretical approaches to the study of international political economy and their application to the explanation and interpretation of historical and contemporary events in world political and economic affairs. Primarily for Elliott School degree candidates.
- 240 **International Politics (3)** Lebovic, Nau
Open to Elliott School students only. Theories of international relations.
- 242 **Politics and Practice of International Institutions (3)** Finnemore
The politics of international institutions in the areas of collective security, peace keeping, trade, money, development, environment, human rights.

- 244 **Politics of International Law (3)** Staff
The political sources and consequences of international law and norms.
- 245 **Comparative Foreign Policy (3)** Staff
The relationship of international actors with one another and with their external environment analyzed in a comparative framework. Focus on nation-states as well as non-state actors, such as international organizations. Differences and similarities in policies on economics, diplomacy, security, and global issues.
- 246 **The Politics of U.S. Foreign Policy (3)** Goldgeier
Patterns and problems in contemporary U.S. foreign policy. Special attention given to the domestic political factors shaping foreign policy.
- 247 **U.S. Foreign Policy Traditions (3)** Nau
Contemporary debate about the substance of American foreign policy through the lens of alternative theoretical approaches to the study of international relations. Classical realist (national interest), neorealist (balance of power), neoliberal (international interdependence and institutions), and constructivist (national identity) interpretations are compared.
- 248 **Politics of U.S. National Security Policy (3)** M. Brown
Examines competing theoretical approaches to the study of national security policy and tests these on a variety of substantive issue areas in the United States. (May include such topics as nuclear non-proliferation, responses to regional conflicts, definition of new security goals, etc.)
- 249 **International Security Politics (3)** Goldgeier, Schmidt

- Overview of the major theoretical debates in international security. How different theoretical approaches inform policy decisions and options.
- 250 **Foreign Policy Analysis—Selected Topics (3)** Staff
Analysis of U.S. foreign policy toward selected world regions.
- 251 **Civil–Military Relations (3)** Staff
Substantive and theoretical issues and debates in the study of civil–military relations.
- 257 **Arms Control and Disarmament (3)** Staff
Major issues and trends in the postwar development of U.S. arms control and disarmament policy.
- 260 **Western European Politics (3)** Feigenbaum
Examination of the principal characteristics of the British, French, German, and Italian political systems, comparing their institutional and behavioral adaptations to the problems of advanced industrial democracies.
- 261 **Politics of European Integration (3)** Staff
The origins, institutions, and politics of West European integration, with emphasis on theories of regional integration and the development of the European Union.
- 262 **The Political Economy of Advanced Industrial States (3)** Feigenbaum
An examination of the relationship between economics and politics in areas such as political development, trade, and monetary policy.
- 264 **Comparative Governments and Politics of Eastern Europe (3)** Wolchik
Comparative analysis of domestic political processes and policies in Eastern Europe.
- 265 **The International Politics of Eastern Europe (3)** Wolchik

Major historical, political, social, and regional factors that have shaped the interwar, World War II, and postwar evolution of Eastern Europe; emphasis on foreign relations with outside powers and on regional East–West contacts.

266 **Government and Politics of Russia (3)** Staff

The politics and development of the Russian state.

270–71 **Politics of China (3–3)** Dickson, Harding, Shambaugh

PSc 270: Readings and discussion of the political dynamics and policy process in contemporary China. PSc 271: Research seminar on selected topics in Chinese politics, using official and other primary sources. Prerequisite to PSc 271: PSc 270 or permission of instructor.

272 **Foreign Policy of China (3)** Shambaugh, Harding

Readings and research on the main approaches to analyzing China's foreign policy and foreign relations.

273 **Political Economy of Industrializing Asia (3)** Bowie

Comparative analysis of the relationship between economic interests and politics in East and Southeast Asia. Emphasis on industrializing economies and their integration into global trade and investment networks.

274 **Governments and Politics of Japan and Korea (3)** Staff

Readings and research on the domestic and foreign policies of Japan and North and South Korea.

275 **International Politics of East Asia (3)** Harding, Mochizuki, Shambaugh

Foreign policies and international behavior of the regional states (especially China, Japan, and Vietnam) and the extraregional powers (especially the U.S. and Russia).

- 276 **The Arab–Israeli Conflict (3)** Reich
Readings and research on the origins, evolution, and issues of the Arab–Israeli conflict.
- 277 **Comparative Politics of the Middle East (3)** Reich, N. Brown
Readings and research on selected problems of the governments and politics of the Middle East.
- 278 **International Relations of the Middle East (3)** Reich, N. Brown, Lynch
Readings and research on the regional and international relations of the Middle East.
- 283 **Comparative Politics of Latin America (3)** McClintock
Readings and discussion on the politics of selected countries in South America, Central America, and the Caribbean. Emphasis on the possibilities for democracy and revolution.
- 284 **International Relations of Latin America (3)** McClintock
Readings and discussion on U.S.–Latin American relations and the foreign policies of selected states.
- 285 **Topics in Empirical and Formal Political Analysis (3)** Lebovic, Wahlbeck, Park
Selected topics in quantitative political methodology and formal political theory with varying emphasis on maximum likelihood estimation, nonlinear models, causal inference, formal theories, and mathematical/computational tools for the social sciences. May be repeated for credit. Prerequisite: PSc 202 or equivalent.
(Offered as the demand warrants)
- 286 **Selected Topics in American Politics (3)** Staff

- In-depth coverage of significant theoretical and empirical issues in American politics, including such topics as political behavior, electoral politics, and race and politics.
- For advanced students. (Offered as the demand warrants)
- 287 **Selected Topics in Political Theory (3)** Staff
- In-depth coverage of significant issues in political theory, including such topics as justice, toleration, and political community. For advanced students. (Offered as the demand warrant)
- 288 **Selected Topics in Comparative Politics (3)** Staff
- In-depth coverage of significant theoretical and empirical issues in comparative politics, including such topics as democratization, the politics of development, the role of the state in advanced industrial societies, gender and ethnicity, and the politics of nationalism. (Offered as the demand warrants)
- 289 **Selected Topics in International Politics (3)** Staff
- In-depth coverage of significant theoretical and empirical issues in international politics, including such topics as comparative foreign policy, ethics and norms in international politics, the politics of military intervention, and theories of security in a post-Cold War environment. For advanced students.
- Offered as the demand warrants)
- 297 **Reading (3)** Staff
- Limited to graduate degree candidates. Written permission of instructor required.
- 298 **Research (3)** Staff
- Limited to graduate degree candidates. Written permission of instructor required.
- 299–300 **Thesis Research (3–3)** Staff
- 303 **Approaches to Policy Analysis (3)** Stoker

Primarily for doctoral students. Empirical and normative foundations of systematic policy analysis: concepts, theories, models, issues, strengths, limitations, and uses and misuses in the policy process.

- 331
- Advanced Theories of Comparative Politics (3)**
- Feigenbaum, Dickson

Major concepts, methods, and theoretical debates in comparative politics, including cultural, rational, and institutional approaches.

- 341
- Advanced Theories of International Politics (3)**
- Sell, Farrell

Perspectives examined range from realism to critical theory and focus upon a variety of explanatory variables.

- 352 Theories of International Security (3) Lebovic

Focus on conflict in different systems and scenarios and on causes and consequences of different strategies. The role of ethics in international security.

- 353
- Advanced Theories of International Political Economy (3)**
- Staff

Major theories of political economy, from classical perspectives on problems of international cooperation to modern treatments of trade, finance, investment, and regulation.

- 354
- Advanced Theories of Foreign Policy Decision Making (3)**
- Goldgeier

- 397
- Advanced Reading (3)**
- Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.

- 398
- Advanced Research**
- (arr.)
- Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit.

770 **Turbulence in World Politics** (3) Rosenau

See the University Professors course listing.

772 **The Dynamics of Globalization** (3) Rosenau

See the University Professors course listing.

PROFESSIONAL PSYCHOLOGY

Professors D.E. Holmes (*Director*), L.J. Ingraham

Adjunct Professors Y.E. Alechina, L. Gump, P. Gedo

Professorial Lecturers P.A. Jennings, J.A. Kasset

Doctor of Psychology in the field of clinical psychology—Prerequisite: a bachelor's degree with relevant background and experience in psychology or its equivalent. Students who lack adequate preparation will be expected to complete prerequisite undergraduate courses during the first year of the program; credit for such courses does not apply to the degree.

Required: the general requirements stated under Columbian College of Arts and Sciences. The three-year program includes the core curriculum (PsyD 201–2, 204, 205, 206, 207, 209, 220–21, 225–26, 227); seven courses chosen from the areas of adult and child psychotherapy—four from one area and three from the other; satisfactory completion of the General Examination; and the completion of the practicum seminar (PsyD 203) for each fall and spring semester as well as two practicums during the summer of the first year.

In addition, successful completion of an externship—a year-long, part-time supervised clinical assignment—is required in each year of the program. A failed externship may, in exceptional circumstances and with the approval of the program director, be repeated. If the

student fails a second time, no further opportunity will be provided, and the student's degree candidacy is terminated.

A one-year, full-time internship at an institution approved by the program faculty is required for completion of the degree program. If the student fails the internship, no further opportunity will be provided, and the student's degree candidacy is terminated.

Note: PsyD courses are limited to students enrolled in the Doctor of Psychology program except by permission of the director. See the Department of Psychology for the degree program leading to the Doctor of Philosophy in the field of clinical psychology.

201–2 Psychological Assessment (3–3)

Cognitive and projective testing, focusing on core batteries used in intellectual and personality assessment. Laboratory fee.

203 Practicum in Clinical Psychology (1)

A continuing practicum, repeated in each semester and summer of the program's three years. In year one, focused on psychological assessment; in upper years, on psychological intervention related to the student's choice of area.

204 Biological Basis of Clinical Psychology (3)

The structure and function of the nervous system and its application to understanding psychopathology. Development of the nervous system in interaction with learning and experience as a central basis of human growth and disability.

205 Psychodynamic Psychopathology (3)

The developmental psychodynamic basis for understanding psychopathology, with comparisons to relevant biological and social explanatory factors.

206 Cognitive Basis of Clinical Psychology (3)

The theoretical and experimental basis of learning, memory, and cognition. Cognitive growth, maturation, and learning. Cognitive processes in relation to the understanding of psychopathology.

207 Group and Organizational Dynamics (3)

Social aspects of adaptive and maladaptive dynamic patterns; group structure and the individual; shared unconscious ideas in wish and defense; small, large, and intergroup (community) dynamics and intervention.

209 Statistics and Research Design (3)

The role of measurement, design, and statistics in clinical psychological research; basic descriptive and inferential statistics; analysis of variance and multivariate designs; case study designs; clinical field research.

210 Professional Issues (3)

The legal and ethical issues in the conduct of professional psychology, including confidentiality, ethical competence, privilege, expert testimony, malpractice, and the insanity defense. Business and ethical issues concerning private practice, licensing, certification, forensics, and insurance reimbursement.

215 Adolescence (3)

The unique characteristics of the adolescence phase—normal development, psychopathology, and treatment approaches. Treatment of the severely disturbed adolescent.

220–21 Psychodynamic Psychotherapy (3–3)

Clinical theories, research, techniques, therapeutic action, and ethics. PsyD 220: ego supportive psychotherapy; psychodynamic formulations; object relational and self-

psychological perspectives. PsyD 221: Exploratory psychotherapy; process and outcome; issues of race, class, ethnicity, gender, and sexuality.

222 Behavioral–Cognitive Therapies (3)

Theoretical and clinical approaches to understanding and modifying behavior, affect, and thought from behavioral and cognitive perspectives. History and development of these perspectives; current work on psychotherapy integration across varying therapeutic approaches.

225 Ego Psychology (3)

An introduction to modern ego psychology: from Freud and Hartmann to Anna Freud, Brenner, Sandler, Abend, Arlow.

226 Object Relations Theory (3)

A historical survey of object relations theory, from Klein, Fairbairn, Winnicott to Bion, Kernberg, Mahler, Jacobsen, Kohut.

227 History and Systems of Clinical Psychology (3)

A review of the historical development of clinical psychology—its roots in mainstream psychology and psychiatry and its modern technical and theoretical systems.

230 Recent Developments in Technique (3)

Current topics and controversies in psychotherapy technique. Readings in Gill, Ross, Brenner, Arlow, Gray, Schwaber, Stone, Etchegoyen.

231 Short-Term Psychotherapy (3)

A study of brief psychodynamically oriented psychotherapy interventions. Focus on clinical vignettes.

232 Character Pathology: Theory and Technique (3)

Recent contributions to the understanding of character pathology and its implications for treatment. Readings in Kernberg, Kohut, Abend, Porder and Willick, Klein, Bion, Winnicott.

233 Issues in Gender Development (3)

Studies of similarities and differences in male and female gender development and sexual object choice. Recent theoretical and clinical contributions. Readings in Freud, Fast, Mayer, Stoller, Tyson and Tyson, Kleeman, Chassaguet-Smirgel, Kaplan, and Friedman.

234 The Nature of Therapeutic Action (3)

How therapy works to bring about change. The function of affect. The role of fantasy and the process of working through. Conflict and compromise in adaptive and maladaptive functioning.

240 Group Psychotherapy (3)

Theory and technique in group psychotherapy; history of group therapy and group analysis; current controversies in the field. Readings in Bion, Ezriel, Scheidlinger, Whitaker, Foulkes, Pines, Anzieu, Ganzarain.

242–43 Psychology and Law (3–3)

The psychological study of the legal process and the application of psychodynamic principles and findings in the legal process. Studies and intervention in the judicial and correctional systems; judge and jury studies; psychological testimony, corrections research and reform; working with special forensic systems and populations.

245 Advanced Group and Organizational Dynamics (3)

Psychoanalytic/psychodynamic study of groups and organizations. Issues of leadership, authority, change management, anxiety containment, open systems, design of task groups, boundaries, role, resistance, organization diagnostic models.

246 **Community Intervention (3)**

Consultation theory and practice related to social service, health, educational, and other not-for-profit organizations. Managing change and action plans.

250 **Neuropsychological Assessment (3)**

Theory and practice of neuropsychological assessment. History and development of the field. Major batteries, individualized approaches, and specialized tests.

251 **Advanced Psychodynamic Assessment (3)**

Recent trends in projective testing; Lerner and Lerner, Schafer, Allison and Blatt, Kwawer, Sugarman, Exner.

252 **Child and Adolescent Assessment (3)**

Case seminar with clinical presentations, focused on the core clinical battery.

Problems of differential diagnosis between neuropsychological hypotheses and conflict-based hypotheses.

255 **Forensic Assessment (3)**

Overview of the professional standards and ethics guidelines for forensic evaluations.

The psychological assessment of criminal cases, the role of the psychologist in expert testimony, and concepts and principles of law encountered in the forensic evaluation process. The role of theory and research in the criminal evaluation process.

260 **Child Development (3)**

Cognitive and emotional factors in the development of normal and abnormal personality dynamics in children and adolescents: experiential and maturational aspects, learning disabilities, the development of conflict and compromise formations; the relevance of child development to adult psychodynamics and psychotherapy.

262 Child and Adolescent Psychopathology (3)

Theory and research on child and adolescent psychopathology. The development of diagnostic categories and their relevance to psychodynamic viewpoints.

264 Child and Adolescent Psychotherapy (3)

Case seminar on child and adolescent treatment. Biological and psychological treatments; intensive vs. short term; conceptualizations of play therapy; differences from adult techniques.

265 Family Therapy (3)

Survey of classical and modern theories of family structure and therapy. History and development of the field. Major schools and current controversies.

266 Clinical Intervention in Schools (3)

Theory and practice of clinical psychological interventions in schools. Testing, observation, consultation. Readings in Newman, Sarason, Goldenberg, Kaplan.

267 Advanced Child Psychotherapy (3)

Technical approaches to selected clinical problems and populations. Trauma, physical and sexual abuse, problems in learning and attention, gender identity disorder, behavior problems, adoption, and divorce. Coordination of developmental and therapeutic processes, and collateral work with parents.

270 Current Topics in Clinical Psychology (arr.)

May be repeated for credit provided the topic differs.

271 Independent Study (arr.)

PROFESSIONAL STUDIES

The following programs and courses are offered by the College of Professional Studies. See also Political Management for the Master of Professional Studies degree programs in the fields of political management and legislative affairs. Information on degree and certificate programs under development as this Bulletin is prepared for press can be found at www.cps.gwu.edu.

All CPS programs indicated in this Bulletin have a prerequisite of a bachelor's degree from an accredited college or university and are subject to the CPS regulations that appear under the respective programs at www.cps.gwu.edu.

With permission of the program director, and provided that prerequisites are met, many courses in CPS programs listed here are available on an open-enrollment basis. Degree candidates enrolled in other GW schools should check with their dean's office to determine whether credit in these courses will apply to their degree.

Master of Professional Studies in the field of landscape design—The 43-credit degree program consists of PSLD 100 through 256.

Master of Professional Studies in the field of molecular biotechnology—The prerequisite bachelor's degree must be in a relevant science or technology field. The program's 39 credits consist of two approved preparatory courses chosen from BiSc 102, Phys 165, CSci 144; PSMB 261 through 266; Bioc 236–37, 254; CSci 207 or 210; Phys 128, 243, 281.

Master of Professional Studies in the field of paralegal studies—The 32-credit degree program consists of PSLX 210 through 219, plus 2 credits of CPS 294.

Master of Professional Studies in the field of law firm management—The 30-credit degree program consists of PSLM 201 through 206, plus 6 credits of CPS 294.

Master of Professional Studies in the field of security and safety leadership—The 36-credit program consists of PSSSL 240 through 270.

Master of Professional Studies in the field of publishing—The program's 30 credits consist of PSPB 201, 203, 205, 207, 209, 213, 232, 251, 263, 281, and elective courses chosen from tracks in journals and periodicals in electronic publishing.

Master of Professional Studies in the field of strategic public relations—The 33-credit degree program consists of PSPR 201 through 208, PMgt 202, PSc 220, two courses chosen from designated PSPR and PMgt courses, plus either CPS 298 or 300.

The College of Professional Studies also offers graduate certificates in landscape design, sustainable landscapes, paralegal studies, public relations, public leadership, law firm management, and health care corporate compliance. Information on certificate requirements is available at www.cps.gwu.edu. Courses pertaining to those programs approved by press time follow. Check with program directors for prerequisites.

LANDSCAPE DESIGN

100 Landscape Graphics (1)

Use of drafting equipment and development of graphic and sketching skills.

Landscape plans, section, elevation, and axonometric drawing.

102 Introduction to Plants (1)

A survey course in plant science: common groups of plants, with a general focus on the structure and function of higher vascular plants.

201 Introduction to Design (2)

Design tools for the landscape designer; analysis of existing landscapes; models and research techniques; design project.

202 Site Analysis (2)

Inventory and recording of existing site conditions, including slope, soil, microclimate, and context. Base plans, sections, and site programs.

203 Site Engineering (2)

Basic site engineering, including grading, drainage, and earthwork; design of steps, ramps, wall, and terraces.

204 Construction Methods and Materials (2)

Commonly used materials; design elements such as decks, patios, fences, and walkways.

205 Digital Representation for Landscape Design (2)

Introduction to a series of digital tools, such as AutoCAD, PhotoShop, Illustrator, and Sketch-UP.

210–11 Site Design I–II (2–2)

Studio course using several small-scale projects to solve a wide range of design problems and resolve conflicts between client requirements and the environmental context.

214–15 Planting Design I–II (2–2)

The process of planting design. Plant characteristics, selection, specification, and cost estimates. Cultural requirements and environmental factors.

PSLD 220 through 228 are field courses held at the National Arboretum and other public gardens, offering identification characteristics, design applications, and aesthetic, functional, and

cultural aspects of approximately 60 trees, shrubs, vines, and flowering plants for each of the periods specified.

220 **Landscape Plants for Early Fall (1)**

222 **Landscape Plants for Late Fall (1)**

224 **Landscape Plants for Early Spring (1)**

226 **Landscape Plants for Late Spring (1)**

228 **Landscape Plants for Summer (1)**

229 **Herbaceous Plants (1)**

The design use, ecology, and cultural requirements of herbaceous and perennial plants commonly used each season. May be repeated for credit.

230 **History of Landscape Design (2)**

Analysis of the built landscape as a physical record of a particular time, revealing influences of culture, politics, geography, natural systems, and precedent.

231 **Contemporary Themes in the Landscape (1)**

Current thinking and trends in shaping the landscape.

240 **Comprehensive Project (2)**

Capstone course. Under the direction of a practicing professional, students prepare a full set of design and working drawings for a selected site.

250 **Introduction to Sustainable Design (4)**

Sustainable design defined as working within an environmental system without negative effect on future requirements. The interaction of forest systems, air, and water to form an ecosystem. Identifying native plants in the selection of appropriate plant material.

251 Ecological Restoration (1)

Many plants imported from elsewhere have escaped their original confines and invaded woodlands. Techniques for removal of exotic invasives and ecosystem restoration.

252 Tools for Sustainable Design (3)

“Reduce/reuse/recycle” as an approach to design and material selection for energy efficiency. Using natural resources when siting buildings and designing landscapes. Approaches to conserving water and avoiding point-source pollution on a site-by-site basis.

253 The Green Scale Spectrum (2)

A significant part of the visual landscape, buildings are responsible for a substantial portion of total energy consumed worldwide. Green design principles and building technology; rating systems used to assess building design and site sustainability; design for biodiversity in urban settings.

254 Sustainable Design Methods (2)

Studio course for application of native plant design to specific sites. Students develop conceptual designs with aesthetic and ecological priorities.

255 Sustenance and the Landscape (1)

Strategies and techniques for introducing edible materials to the landscape as an aspect of sustainable management of resources.

256 Sustainable Design Charrette (2)

Studio design capstone course. Expansion of techniques to unify sustainable elements in a single creation. Either singly or in groups, students work in a focused design, development, and juried presentation process on a sustainable site design.

MOLECULAR BIOTECHNOLOGY

261–62 Physics of Biotechnology I–II (3–3)

Basic physical principles underlying experimental exploration and the mechanisms behind the fields of proteomics, bioinformatics, and genomics. PSMB 261: fundamentals of molecular detection; PSMB 262: applications to biosensors.

263 Management of Innovation (3)

Business, technological, economic, and political factors that influence development of scientific and technical products, processes, and services.

264 Technology Entrepreneurship and Intrapreneurship (3)

The process of innovation within and outside the corporate setting to launch and build new ventures, including internal technology venture initiation.

265 Commercialization of Science and Technology (3)

The later stages of the innovation process, in which the transfer from development stages to commercial deployment must be accomplished effectively.

266 Capstone Project (1)

Guided independent research and writing or team projects.

PARALEGAL STUDIES

210 American Jurisprudence (3)

Local, state, and federal court systems; jurisdiction and venue; procedural rules and rules of evidence; ethical considerations.

211 Legal Research and Writing (3)

Legal research tools and methodologies; print and electronic resources; drafting, editing, and preparing legal documents.

212 Litigation (3)

Elements of effective litigation support for a standard civil action, including procedure, rules, and technology.

213 Corporations and Contracts Law (3)

The processes of corporate law practice; corporate entities; SEC rules and regulations; the Uniform Commercial Code; contract formation; business ethics.

214 Administrative Law (3)

The structure, scope, and regulatory procedures of various federal, state, and local administrative agencies.

215 Government Contracts Law (3)

The law and processes of the procurement, formation, and execution of government contracts.

216 Elements of Intellectual Property Law (3)

Legal structure of the various parts of an intellectual law practice, including patent, trade, and copyright law.

217 Prosecution and Litigation in Intellectual Law Practice (3)

Processes, supporting documentation, laws, and rules of IP prosecution and litigation.

218 International Trade and Finance (3)

The law of international trade, licensing, and investment; basics of international commercial and contract law.

219 International Litigation (3)

The rules, processes, and law of international litigation and international organizations.

PUBLIC RELATIONS

201 Public Relations Principles and Practices (3)

Basic rules and strategies in public relations. Major trends; major firms; types of business; expertise; and career trajectories in the field. New media and integrated media communications.

202 Advanced Writing for PR Professionals (3)

Strategic thinking and compositional precision as the source of PR efficacy and power. Writing for blogs, websites, and other online media. Students compose a press kit in both draft and edited form.

204 Media Relations in the New World Media (3)

Media relations from both public relations and public affairs perspectives. Factors that influence reportorial and editorial coverage of business, government, and nonprofit interests.

205 The Business and Budgeting of Public Relations (3)

Management aspects, including the financial practices and human relations issues, in consulting firms, trade associations, advocacy organizations, or interest groups.

Students develop a detailed budget for a PR program or public affairs project.

206 Ethical Standards in Public Relations and Public Affairs (3)

Standards, guidelines, and codes of conduct that can guide relations with clients, the media, public officials, and others. Students learn how to identify and respond to ethical challenges.

208 Strategic Marketing and Marketing Communications (3)

The evolution of integrated marketing communications to extend the reach and influence of public relations and public affairs, including branding, podcasts and cause marketing. Integration of old and new media.

209 Media Law (3)

Legal standards and rules governing PR interactions with media; legal and regulatory limits on PR activity in advocacy. Prerequisite: PSPR 205.

210 Special Topics (3)

Topics to be announced. May be repeated for credit provided the topic differs.

221 Consumer Behavior (3)

Development of consumer preferences [public opinion] with applications in PR campaigns. Prerequisite: PSc 223.

222 Multicultural Marketing (3)

Application of media theory in multicultural settings. Bilingual or multilingual PR campaigns. New media practices.

PUBLISHING

201 Book and Journal Publishing (3)

Overview of publishing: acquisition, contract negotiation, editing, design and production, marketing and sales, and subsidiary rights.

203 The Business of Publishing (2)

Topics include presswide and departmental budgets, title budgets, book and subscription pricing, contracts, and marketing plans.

205 Copyright Law (3)

U.S. copyright law as it applies to print and electronic media. The history of copyright law through legislation and court cases.

207 Marketing Strategies (2)

Marketing trade and scholarly books. The interaction of marketing departments with authors and with editorial, production, sales, and finance departments.

209 Subsidiary Rights (2)

The various types of subsidiary rights in trade and academic publishing; their use in generating income and their fit in overall marketing and budget development.

213 Book Design (2)

The design process, including the use of various design software programs, the impact of design technology, and interface with other parts of the publishing enterprise.

232 Production Management (3)

Production management as it applies to traditional book publishing and to projects requiring the integration and application of new technologies.

241 Scientific, Technical, and Medical Publishing (2)

The overall process, practices, and players in scientific, technical, and medical publishing. Aspects of the publishing process that are unique to this sector.

243 Scholarly and Professional Journals (2)

Development of the journal as a primary vehicle of scholarly communication for most disciplines. Current practices and processes.

245 Publishing Periodicals Online (2)

Business practices, technology, and mechanics of online periodical publishing.

Business models; XML and HTML markup languages; content management systems.

251 Fundamentals of Electronic Publishing (2)

Practical issues faced in electronic publishing. Integrating traditional production technologies with long-term digital publishing strategies.

253 Electronic Publishing Practice (2)

Pragmatic, economic, and ethical aspects of electronic publishing for responsible decision making. Prerequisite: PSPB 251.

255 E-Publishing Infrastructure (2)

The strengths, weaknesses, and utilities intrinsic to content architecture, including reapplications of existing data and open source vs. proprietary solutions. Prerequisite: PSPB 251.

257 Design for E-Publishing (2)

Principles of digital design: usability testing, search engine optimization, iterative design, and multiple presentational models. Prerequisite: PSPB 251.

263 Research, Indexes, and Bibliographies (2)

Research and fact checking; accessing library online research sources and databases; tracking electronic publications; locating authoritative sources; overseeing indexing.

281 Summer Publishing Institute (1)

The capstone course for the Master of Professional Studies in the field of publishing.

SECURITY AND SAFETY LEADERSHIP

240 Political Violence and Terrorism (3)

The evolution of terrorism and politically motivated violence. Shifts in the operational tactics of guerrilla, terrorist, and insurgent groups and rogue states.

Approaches to the formulation of counterterrorist strategies.

241 Globalization of Threats and International Security (3)

The conduct of national and international threat assessment. The various international legal and strategic options available to public safety agencies.

242 Security and Civil Liberties (3)

Issues that arise as states attempt to reconcile the maintenance of civil liberties and human rights with the control of crime, prevention of terrorism, and protection of its citizens.

243 Intelligence and Strategic Analysis (3)

The structure and components of the intelligence and law enforcement communities. International intelligence cooperation. Analysis of counterterrorism policies and strategies at the international, national, and regional levels.

244 Information Systems Protection (3)

The various types of cyber crime and the vulnerability of government computer systems and information networks. Mitigation strategies for the protection of information and computer systems.

250 Strategic Planning and Budgeting (3)

The adaptation of strategic planning and performance measures beyond budgeting for the requirements of government agencies that deal with long-term security issues.

251 Interagency Cooperation (3)

Cooperation initiatives across agencies through mutual assistance agreements and regional, national, and international structures. Issues of technology interoperability and legal and interorganizational challenges.

252 Emergency Management and Crisis Communication (3)

Basic principles of emergency planning, including development of an across-the-board response plan involving all levels of government and the private sector.

Strategies for ensuring that communication channels are open and secure during a crisis situation.

253 Managing the Politics of Leadership (3)

An in-depth look at the role of power and influence in organizations. Case studies demonstrate the necessity of mobilizing the political support and resources needed to implement objectives.

254 Strategic Change Leadership (3)

The challenges, techniques, burdens, and successes associated with initiating and implementing change within an organization. The process of organizational change from multiple theoretical vantages.

260 Methods of Analysis in Security (3)

Methods and problems of data collection in security fields, with emphasis on analytical design, instrument utilization, sampling, and measurement.

270 Capstone Project (3)

Development of a research project integrating theoretical and analytic perspectives applied to improving organizational effectiveness in public safety agencies.

PUBLIC LEADERSHIP

201 Mastering Public Leadership (4)

Key competencies associated with successful leadership in the contexts of public leadership, dyadic and team processes, organizational structure and culture, and professional networks.

202 Performance-Based Financial Management (2)

The role of managerial and cost accounting, auditing, and financial controls in the efficient and effective allocation of organizational resources.

204 Public–Private Partnerships and Contract Management (2)

Policy and implementation issues in privatization, contracting-out, competitive sourcing, and public–private partnerships as methods of delivering government services.

205 Results-Oriented Leadership (2)

Exploration of statutory and regulatory requirements placed on federal leaders and managers. What works in changing management cultures to become more results-focused.

206 Leading Change (2)

Dynamics of personal and organizational change. Strategies for leading planned change efforts to initiate, gain support for, and sustain changes in policy and operating processes.

208 Leadership in an Era of Digital Government (2)

The role that leaders play in building the information capabilities that ultimately influence organizational development and employee behavior and performance.

209 Leading for Organizational Performance (4)

Capstone course for integration of concepts developed in the public leadership program. Students participate in a simulation and present results of individual projects. Prerequisite: completion of all other PSPL requirements.

LAW FIRM MANAGEMENT

201 Theories, Principles, and Practices of Law Firm Management (6)

Emerging trends in the legal market, firm leadership and strategic thinking, economics and profitability analysis of the firm, talent management, managing client service, management and compensation structures, and managing change.

202 Applying Strategic Management (3)

Team projects using a simulated law firm case study, including practice group and office profitability analysis, market assessments, creation of strategic plans, and merger analyses. Prerequisite: PSLM 201.

203 Practical Applications of Law Firm Management (3)

Presentation of strategic plans, analyses, and recommendations developed in PSLM 202 before a panel of faculty, managing partners, and law firm professionals. Prerequisite: PSLM 202.

204 Principles of Leadership (6)

An intensive course focused on theories and principles of leadership within firms, including leading organizational change. Prerequisite: PSLM 203.

205 Application of Leadership Frameworks (3)

Concepts and frameworks that highlight leadership roles in firms. Prerequisite: PSLM 204.

206 Strategic Leadership for Sustainability and Change (3)

Integration of the content of PSLM 204 and 205 through a focus on strategic leadership. Prerequisite: PSLM 205.

HEALTH CARE CORPORATE COMPLIANCE

201 Introduction to Health Care Corporate Compliance (3)

Core elements and strategies for compliance plan development and implementation. Key statutes and regulations, policy guidance, and enforcement initiatives.

202 Compliance with Laws and Regulations (3)

Issues of governance and corporate responsibility, antikickback and antitrust law, Civil False Claims Act, Emergency Medical Treatment and Active Labor Act, HIPAA. Prerequisite: PSHC 201. May be repeated once for credit.

203 Case Studies in Health Care Corporate Compliance (3)

Case study approach to investigation and analysis of compliance issues. Application of principles and diagnostic and remediation skills to real-world situations. Prerequisite: PSHC 202.

COLLEGE OF PROFESSIONAL STUDIES

294 Independent Research (1 to 6)

Registration with approval of the program director or the dean.

298 Practicum (0 to 3)

300 Thesis (3)

PSYCHOLOGY

Professors E. Abravanel, L.A. Rothblat, R.A. Peterson, P. Wirtz, C.K. Sigelman, L.R.

Offermann, P.J. Poppen (*Chair*), E. Hirshman (*Research*), M.C. Zea, P. Barratt, G. Howe

Associate Professors L. Brandt, C.A. Rohrbeck, S. Dopkins, S.D. Molock, J.M. Ganiban, D.P.

Costanza, E. Davis, P.J. Moore, J.W. Philbeck, C. Gee, H.N. Le, A.N. Zucker

Assistant Professors C. Beil (*Research*), D.E. Schell, S. Lambert, M.H. Sohn, M. Stock, S.

Shomstein

Adjunct Professor K. Ross-Kidder

Clinical Training Staff

Associate Clinical Professors D.M. DePalma, R.L. Jenkins, L.E. Moldauer

Assistant Clinical Professors H.S. Lovett, A.L. Auerbach, E.A. Wiggs, S. Martin, R. Broudy

Doctor of Philosophy in the field of psychology—Prerequisite: the degree of Bachelor of Arts with a major in psychology. Students whose academic preparation is in other disciplines will be expected to complete prerequisite undergraduate courses to prepare for graduate study in psychology before admission to the field.

Required: the general requirements stated under Columbian College of Arts and Sciences, including (1) Psyc 202, two graduate psychology courses outside the chosen field and approved by the advisor, and appropriate statistics courses; and (2) the satisfactory completion of the General Examination in the major area of study. The Department of Psychology offers concentrations in clinical psychology, cognitive neuroscience, and applied social psychology. The concentration in industrial/organizational psychology is offered by the Department of Organizational Sciences and Communication. For specific requirements, consult the director of the concentration concerned.

Courses at the 200 level are limited to graduate students in psychology, except by permission of instructor. With permission, a limited number of 100-level courses in the department may be

taken for graduate credit; additional course work is required. See the Undergraduate Programs Bulletin for course listings.

202 Psychological Research Methods and Procedures (3) Howe

Required in all graduate psychology programs. Includes philosophy of science, types of research design, and methods of data collection. Prerequisite: graduate standing, a laboratory course in psychology, and a course in statistics.

203 Experimental Foundations of Psychology: Learning, Memory, and Cognition (3) Dopkins

Current conceptions of learning, memory, and cognition; the research upon which these conceptions are based; applications to practical contexts.

204 Experimental Foundations of Psychology: Rothblat Biological Basis of Behavior (3)

Introduction to the structure and function of the nervous system. Topics include neural communication, sensory processes, memory, neuroendocrinology of sex differences and stress, psychiatric and neurodegenerative disorders.

207–8 Psychological Assessment (3–3) Staff

Open only to clinical graduate students in the Department of Psychology. Theoretical and clinical aspects of assessment; includes interviewing, psychometric tests, and projective techniques. Two-hour laboratory—diagnostic work at clinical facilities. Material fee. (Academic year)

210 Developmental Theories and Issues (3) Staff

Orientation to the field of developmental psychology, with emphasis on traditional and contemporary theories, fundamental concepts and issues, and methodological approaches.

211–12 **Community Psychology I–II (3–3)** Lambert

For graduate students in the Department of Psychology; open to others with permission of instructor, and only if space permits. Psyc 211: Survey of the history, theories, and values guiding community psychology; models of service delivery. Psyc 212: Applications of the principles and theories of community psychology to interventions and research. Psyc 211 is prerequisite to Psyc 212.

213–14 **Seminar: Developmental Psychology (3–3)** Abravanel

Psyc 213: research and theory in developmental psychology, with topics drawn from cognitive, perceptual, and language functioning development. Psyc 214: current research and theoretical issues in social and personality development in childhood and adolescence. (Academic year)

216 **Developmental Psychopathology (3)** Ganiban

A comprehensive introduction to the field of developmental psychopathology. Origins, evolution, and long-term consequences of developmental psychopathology. Genetic and biological origins of psychopathology.

218 **Evidence-Based Interventions (3)** Le

Introduction to theory and technique of psychotherapeutic approaches of proven effectiveness. (Spring and summer)

223 **Seminar: Human Memory (3)** Staff

Selected topics of current research interest in the area of human memory. Emphasis on encoding and retrieval processes, amnesia, and disorders of memory.

225 **Behavioral Approaches to Child Assessment and Therapy (3)** Rohrbeck

- Child assessment and treatment from a behavioral viewpoint. The application of conditioning, reinforcement, and shaping principles with reference to specific disorders of childhood.
- 226 **Seminar: Clinical Psychology of Childhood and Adolescence (3)** Staff
For graduate students in psychology; open to others with permission of instructor. Exploration of major topics concerning psychopathology in children and adolescents; discussion of nosological issues with emphasis on theoretical and research literature.
- 227–28 **Seminar: Principles of Psychotherapy (3–3)** Staff
For graduate students in clinical psychology; open to others with permission of instructor, if space permits. Patient's needs and demands on the therapist. Case participation heavily relied upon. Prerequisite: Psyc 218. (Alternate academic years)
- 229 **Seminar: Principles of Behavior Change (3)** Peterson
Behavioral learning methods and theory applied to clinical problems. (Fall)
- 231 **Development of Psychometric Instruments (3)** Staff
Quantitative techniques and principles used in construction, standardization, and evaluation of personality and ability measures for research and practice; quantification of human judgment for measurement purposes. Prerequisite: course in tests and measurements and an elementary course in statistics. (Fall)
- 236 **Ethnic and Racial Diversity in Psychology (3)** Zea
Basic theoretical models of research in ethnic, racial, and cultural diversity and new directions in the field. The impact of being an ethnic minority in the United States.
- 237–38 **The Practice of General Psychology (3–3)** Gee, Rohrbeck, Molock, Peterson

- Application of psychological principles and findings to a wide spectrum of human problems. Professional issues facing the psychologist offering services. Participation in the development, implementation, and evaluation of applied psychological services and projects. (Academic year)
- 240 **Psychopathology (3)** Molock
Research and theory in psychopathology. (Fall)
- 241–42 **Family Systems: Theory, Practice, and Research (3–3)** Howe
Family dynamics and their implications for assessment and treatment. Special emphasis on the role of research in the process of evaluation of family systems and family therapy. Enrollment limited to advanced doctoral students in clinical psychology. (Academic year)
- 244 **Theories and Processes of Organizational Management (3)** Staff
Basic functions and techniques of organizational management—design, control, direction, and decision making—examined from the viewpoint of behavioral science.
- 245 **Seminar: Organizational Behavior (3)** Offermann
Analysis of organizational behavior; emphasis on motivation and productivity. Recent research on employee attitudes, primary group, supervisory leadership, formal and informal organization, job design. (Fall)
- 246 **Seminar: Personnel Evaluation Techniques (3)** Staff
Techniques of personnel selection and performance evaluation. Employment tests, personal data, assessment interviews, performance ratings, and assessment centers. Federal guidelines in employee selection. Includes practicum.
- 247 **Seminar: Psychology of Leadership in Organizations (3)** Offermann

- Theories and issues related to the emergence and effectiveness of leaders, with focus on leadership behaviors and processes in organizations.
- 248 **Research Applications to Organizational Intervention and Change (3)** Staff
Emphasis on development of models of organizational effectiveness; design of valid diagnostic instruments; implementation of research strategies; establishment of program evaluation criteria. (Fall)
- 251 **Behavioral Neuroscience (3)** Rothblat
The neural basis of behavior, with special focus on the psychobiological determinants of learning, memory, and cognition. Methodologies used for different levels of analysis with normal and brain-impaired subjects.
- 253 **Social Cognition (3)** Staff
Social psychology theories, conceptual approaches, and their applications. Social cognition, person perception, attribution, information processing, attraction, stereotyping.
- 254 **Social Influence (3)** Stock
Social psychology theories, conceptual approaches, and their applications. Analysis of intentional and unintentional social influence processes and their effects on behavior. Current research on conformity, social power, social exchange, and impression management.
- 255 **Attitudes and Attitude Change (3)** Poppen
Current theory and research on attitudes and attitude change.
- 256 **Introduction to Survey Research (3)** Poppen

- Theory and practice of face-to-face telephone and mail surveys. Practical experience with all stages from the formulation of research questions and hypotheses to questionnaire design, sampling, pilot, testing, interviewing, coding, and data cleaning. Prerequisite: Stat 105 or equivalent. (Fall)
- 257 **Current Topics in Social Psychology (3)** Poppen
Advanced seminar with focus on major theoretical approaches, research, or problem areas within field of social psychology. Topic changes each semester.
(Fall and spring)
- 259 **Psychology of Individual and Group Decision Making (3)** Moore
Examination of processes in organizational decision making and group behavior. Topics include group and individual decision-making approaches, decision aids and support systems, performance and decision effectiveness, and risk analysis.
- 260 **Psychology of Work Group Development (3)** Offermann
Examination of theory and research on groups as task performance systems. Approaches to team development as a means of improving work group effectiveness, including goal setting, role clarification, increasing interpersonal skills, and conflict resolution. (Spring)
- 263 **Evaluation Research (3)** Staff
Research issues and methods in evaluating the impact of organizational and social intervention and service programs. Specification of program goals and effectiveness criteria; measurement problems; experimental and quasi-experimental designs; political problems surrounding evaluation research. (Spring, even years)
- 268 **Seminar: Neuropsychology (3)** Rothblat

- Selected problems in research relating the brain and behavior. Independent topics each semester, such as sensory processing, brain development and behavior, clinical aspects of nervous system function.
- 275 **Women and Health (3)** Zucker
same as WStu 275.
- 277 **Health Psychology (3)** Moore
Social psychological theories and research that relate to health and illness. Application of theories of social learning, attribution, attitude change, and social influence to topics such as health promotion and disease prevention, health compliance, and coping with illness and disability.
- 278 **Behavioral Medicine (3)** Peterson
The psychological causes, outcomes, and treatments for a wide variety of medical illnesses. Examination of research on the effectiveness of programs designed to promote health, to encourage compliance, and to foster lifestyle changes.
- 279 **Special Topics in Health Psychology (3)** Staff
May be repeated for credit provided the topic differs. Admission by permission of instructor.
- 281 **Clinical Neuropsychology I (3)** Rothblat
Analysis of experimental and clinical findings from studies attempting to localize and interpret human brain dysfunction, with emphasis on perceptual and cognitive behavior. Topics include overviews of neuroanatomy and neurological techniques, theoretical consideration of major neuropsychological disorders. Admission by permission of the instructor.

- 282 **Clinical Neuropsychology II (3)** Staff
- Examination of important psychological procedures for the assessment of human brain dysfunction. Instruments and batteries such as the Bender-Gestalt, Wechsler Adult Intelligence Scale, Halstead-Reitan Neuropsychological Battery, and Luria's Neuropsychological Tests. Prerequisite: Psyc 211, 281, and permission of the instructor.
- 287 **Current Topics in Clinical Psychology (3)** Staff
- Advanced seminar with focus on major theoretical approaches, research, or problem areas. Topics vary. May be repeated for credit.
- 288 **Current Topics in Industrial/Organizational Psychology (3)** Staff
- Advanced seminar with focus on major theoretical approaches, research, or problem areas. Topics vary. May be repeated for credit.
- 289 **Seminar: Current Topics in Experimental Psychology (3)** Philbeck, Sohn
- Review and discussion of contemporary research and theory in a specialized field of psychological study, by leaders in the field. Independent topics each semester; may be repeated for credit. (Fall and spring)
- 291 **Theories of Organizational Behavior (3)** Staff
- Examination of current theoretical models and research. (Spring)
- 295 **Independent Research (3)** Staff
- Individual library or experimental research under supervision of staff member.
- Arrangements must be made with sponsoring faculty member prior to registration.
- May be repeated for credit.
- 299–300 **Thesis Research (3–3)** Staff

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy major field examination.

May be repeated for credit.

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit.

PUBLIC POLICY AND PUBLIC ADMINISTRATION

University Professor S.J. Trachtenberg

Professors K.E. Newcomer, W.C. Adams, E. Berkowitz, G. Brock, J.J. Cordes (*Director*), A.

Dor, R.S. Goldfarb, W.B. Griffith, M.M. Harmon, D.L. Infeld, P.G. Joyce, J.E. Kee, M.

Raskin, S. Rosenbaum, R.W. Rycroft, G.D. Squires, C.H. Sterling, S.A. Tuch, N. Vonortas,

P.W. Wirtz, H.L. Wolman, M.J. Worth

Associate Professors S.J. Balla, J.M. Brinkerhoff, D.S. Cropp, P. Davidson, C. Deitch, E.J.

Englander, C.E. Harrison, J.F. Kastle, A.S. Malik, Y. Nakib, M. Starik, R.P. Stoker, L.A.

Brainard

Assistant Professors D. Conger, S. Cellini

Through its Trachtenberg School of Public Policy and Public Administration, Columbian College of Arts and Sciences offers the Master of Public Policy, Master of Public

Administration, and the Doctor of Philosophy in the field of public policy and administration.

The master's programs provide academic preparation toward professional careers in government, business, and the nonprofit sector. In addition, a graduate certificate in nonprofit management is offered; three Master of Arts programs are affiliated with TSPPPA (see below).

Master of Public Policy—Prerequisite: a bachelor's degree from a regionally accredited college or university.

Required: The general requirements stated under Columbian College of Arts and Sciences. The 40-credit-hour program consists of a six-course policy core (PPol 201, 202, 204, 205 or 211, 206, and 215); a three-course policy field; a course in public program evaluation and budgeting and a course in historical and ethical perspectives in public policy (each chosen from designated courses or approved by the advisor when specific to the selected policy field); and two electives chosen with approval of the advisor. Policy fields include budget and public finance, education policy, environmental policy, gender and social policy, health policy, international development management, labor market policy, national security policy, nonprofit management, philosophy and social policy, program and policy evaluation, public budgeting and finance, public-private policy and management, science and technology policy, social policy, urban policy, and race, ethnicity, and public policy.

The Master of Public Policy is available in a dual degree program with the Ph.D. in the field of political science and a joint degree program with the J.D. in the GW Law School.

Master of Public Administration—Prerequisite: a bachelor's degree from a regionally accredited college or university.

Required: The general requirements stated under Columbian College of Arts and Sciences. The 40-credit-hour program includes a 22-credit core (PAd 200, 201, 202, 203, 204, 205, 206, and 207). Each student selects three or four courses chosen from budget and public finance; federal policy, politics, and management; international development management; managing in public organizations; managing state and local governments; nonprofit management; policy analysis and evaluation. Students may elect such other three-course fields as strategic management and public policy, organizational behavior and development, information systems management, international business, health services administration, and management decision

making. With approval, a special field may be constructed, tailored to the student's academic interests and career objectives. The remainder of the program consists of elective courses chosen by the student with the advisor's approval from any related program or discipline. Students who do not have professional work experience are required to gain such during their program.

The curriculum is accredited and provides graduate instruction in all areas recommended by the Guidelines and Standards for Professional Master's Degree Programs issued by the National Association of Schools of Public Affairs and Administration.

The Master of Public Administration is available in a joint degree program with the J.D. in the GW Law School.

Doctor of Philosophy in the field of public policy and administration—Required: the general requirements stated under Columbian College of Arts and Sciences, including (1) the prequalifying core curriculum: PPol 204, PPol 211 or Mgt 225, PAd 373 and 395, PAd 205 or Econ 222, PAd 225 or Phil 230, PSc 303 and 229; (2) a written qualifying examination; (3) an additional approved course in quantitative or qualitative research methods; (4) PPol 390 and 391; (5) a minimum of 18 hours in one of the following areas: education policy; health policy; budgeting and public finance; program evaluation; administration and management; international development; science and technology policy; urban and social policy; and race, gender, and public policy; (6) a written examination in a policy or public administration field.

Columbian College of Arts and Sciences also offers affiliated interdisciplinary programs leading to the degree of Master of Arts. The M.A. programs enable students to concentrate in a specific policy area, while completing courses in economics, politics, quantitative methods, and approaches to policy analysis.

Master of Arts in the field of public policy with a concentration in environmental and resource policy—See Environmental and Resource Policy.

Master of Arts in the field of public policy with a concentration in philosophy and social policy—See Philosophy.

Master of Arts in the field of public policy with a concentration in women's studies—See Women's Studies.

Note: Courses offered by or for the Trachtenberg School of Public Policy and Public Administration may be limited to students enrolled in its programs. See the School of Business and the Elliott School of International Affairs for other graduate degree programs with public policy concentrations.

PUBLIC POLICY

201 Politics and Public Policy (3)

Rycroft

The role of policy analysts in public policymaking. The impact that the political, economic, cultural, and bureaucratic context has on the policymaking process and outcomes. Political and ethical issues raised by the intricate interface of the private, not-for-profit, and public sectors in public policy formulation and implementation. Same as PSc 229.

202 Research Methods and Applied Statistics (3)

Adams, Conger, Davidson, Newcomer

Development of skills and knowledge for conducting original research and critically evaluating empirical studies. Various research designs and data collection techniques are examined. Focus on computerizing data sets for quantitative analysis, analyzing

strength of relationships, selecting appropriate statistical techniques, and testing statistical hypotheses. Same as PAd 202.

204 **Economics in Policy Analysis** (3) Brock, Cordes, Goldfarb

The application of intermediate microeconomic theory to the study of public policy.

Topics include: models of individual choice in policy analysis, policy aspects of models of the firm, theory of market failure and welfare economics, and resource allocation decisions in the public sector. Prerequisite: Econ 217 or equivalent. Same as Econ 221; credit cannot be earned for PPol 204 and SMPP 206.

205 **Intermediate Qualitative and Quantitative Analysis** (3) Newcomer

Theory and practice of research methodology, with a public policy emphasis.

Qualitative and quantitative data sources and gathering, research models and designs, and analysis and interpretation. Prerequisite: PPol 202 or equivalent.

206 **Policy Analysis** (3) Conger, Infeld

Development of skills in conducting and critiquing policy analyses. Application of methodologies used in analyzing possible consequences of specified alternatives as applied in the public policy decision-making process. Appropriate applications and limitations of policy analysis and its relationship to politics and the policy process. Same as PAd 206.

207 **Environment, Energy, Technology, and Society** (3) Starik

The identification, examination, and evaluation of how environment, energy, and technology are interrelated and how these interactions influence policy formulation and implementation at the international, national, regional, industrial, and organizational levels. Same as SMPP 207.

208 **Public Policy, Governance, and the Global Market (3)** Staff

The socioeconomic foundations of government regulation and public policy cooperation for the governance of firms, markets, and globalization. The evolution of national, transatlantic, and multilateral frameworks for market and civil society governance, international competition policy cooperation, regulatory harmonization, and industry standards.

211–12 **Research Methods in Policy Analysis (3–3)** Conger, Cordes

PPol 211: Multivariate research methods in policy analysis; PPol 212: multivariate and causal modeling, experimental and quasi-experimental designs, and measurement issues. Prerequisite to PPol 211: PPol 202 or equivalent; prerequisite to PPol 212: PPol 211 or equivalent.

215 **Capstone Seminar:** Cordes, Wolman

The Ethics and Practice of Public Policy (3)

Policy theory and typologies; policy formulation, implementation, and evaluation; ethics and practice in policy analysis, policy processes, content, and contexts; and policy linkages to multiple disciplines. Students submit an analysis of a substantive policy primarily utilizing resources in the D.C. region.

285 **Special Topics in Public Policy (3)** Staff

Topics announced in the Schedule of Classes. May be repeated for credit, provided the topic differs.

298 **Independent Research (arr.)** Staff

Prerequisite: Permission of instructor and program director.

385 **Advanced Special Topics in Public Policy (3)** Staff

Topics announced in the Schedule of Classes. Limited to doctoral students or master's students with instructor approval. May be repeated for credit provided the topic differs.

- 390 **Philosophical Foundations of Policy and Administrative Research (3)** Harmon

Philosophy of science as applied to research in public policy and public administration. Topics include the nature and current problems of epistemology, development and role of theories, and relationships among theory, methodology, and empirical data.

- 391 **Dissertation Workshop (3)** Cordes, Infeld, Newcomer

Limited to doctoral candidates who have taken and passed the qualifying examination and completed all required course work in a policy or public administration field. Critical analysis of current research. Formulation of a dissertation proposal and development of dissertation research strategies.

- 398 **Advanced Reading and Research (arr.)** Staff

Limited to students preparing for the Doctor of Philosophy general examination.

- 399 **Dissertation Research (arr.)** Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit.

PUBLIC ADMINISTRATION

- 200 **Cross-Sectoral Governance in the U.S. Federal System (1)** Harmon, Kee

Introduction to the roles and responsibilities of the public, nonprofit, and for-profit sectors in the delivery of public goods and services. (Fall)

- 201 **Introduction to Public Service and Administration (3)** Brinkerhoff

Introduction to the discipline of public administration. The intellectual traditions and theoretical frames of reference that inform public administration as a field of professional practice and study. Current and continuing challenges and controversies.

(Fall)

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| 202 | Research Methods and Applied Statistics (3) | Adams, Newcomer, Conger, Davidson |
| | Same as PPol 202. | |
| 203 | Economics for Public Decision Making (3) | Cellini |
| | The basic tools and concepts in microeconomic analysis; how these tools can be useful in public decision making. (Fall and spring) | |
| 204 | Leadership in Public Administration and Public Policy (3) | Kee |
| | Organizational dynamics, management approaches, and workplace relationships that affect behavior in public organizations. Prerequisite: PAd 201. (Spring) | |
| 205 | Public Budgeting, Revenue, and Expenditure Analysis (3) | Joyce, Cordes |
| | Survey course that focuses on the institutions and analytical tools associated with raising revenue and allocating/managing resources at all levels of government. Hands-on budgeting skills and communication of analysis to decision makers. Prerequisite: PAd 203. (Spring) | |
| 206 | Policy Analysis (3) | Infeld, Conger |
| | Same as PPol 206. | |
| 209 | Capstone Seminar (3) | Brainard |

Review of concepts and issues; analysis and integration of ethical, political, economic, managerial, and personal values and issues in the field. Open only to M.P.A. degree candidates in their final semester of study. (Spring)

212 **Legislative Management and Congress (3)** Brainard

Analysis of Congress as a management system; examination of its internal administration and its role in formulating policy through legislation. Staffing practices, leadership, rules and procedures, oversight functions, and coalition building. (Fall)

215 **Law and the Public Administrator (3)** Kasle

Exploration and analysis of the functions of law in a democratic society. Emphasis is placed upon the procedural, historical, and jurisprudential dimensions of American law. This broad perspective seeks to convey understanding of the law as a legal and moral force guiding and constraining public decision making. (Spring and summer)

216 **Federal Government Regulation of Society (3)** Brainard

Analysis of the federal regulatory process as it affects the public and private sectors. The regulatory process from legal, economic, administrative, and political perspectives. (Spring)

217 **International Development Administration (3)** Brinkerhoff

An institutional and policy context for work in the international development industry. Mainstream policies, reform efforts, and alternative approaches. Major actors, selected policy areas, and regional and comparative perspectives. (Fall)

218 **International Development NGO Management (3)** Brinkerhoff

Provides an understanding of the primary implementers of international development assistance. Overview of NGO management, highlighting those features that are particular to NGOs active in international development, including NGO relations with government and donors. (Spring)

219 **International Development Management Processes and Tools (3)** Brinkerhoff

Training in development management tools and processes; application of international development approaches specific to the development management profession. Key theories and perspectives of community development and development management.

224 **Leadership in Complex Organizations (3)** Kee

What the manager must know and do to provide leadership and guidance in large, complex organizations. An exploration of leadership theories and the factors and processes that condition effective leadership. (Spring)

225 **Ethics and Public Values (3)** Harmon

Ethical dimensions of personal and professional judgments of public officials. Cases are used to consider the ethos of public organizations and the moral foundations of public policy. (Fall)

231 **Governing and Managing Nonprofit Organizations (3)** Worth

Historical, legal, and social foundations of the nonprofit sector. Developing organizational strategy and capacity; managing staff, boards, and volunteers; financial management; fund raising, marketing, public advocacy, and other external relations; partnerships and entrepreneurial activities; measuring performance; and policy issues.

232 **Managing Fund Raising and Philanthropy (3)** Worth

Fund-raising for nonprofit organizations and the management of relationships between donors and recipient organizations. Positioning the organization for fund raising; roles of staff and volunteers; principal techniques for identifying, cultivating, and soliciting donors; ethical principles; emerging trends; and relevant policy issues.

233 **Nonprofit Enterprise (3)** Worth

The use of business methods by nonprofit organizations, commercialization in the nonprofit sector, and the relationship between nonprofit and for-profit entities in pursuing social purposes. Case studies.

242 **Managing State and Local Governments (3)** Staff

Examination of state and local governmental structures and functions, their place within the federal system, their revenue sources, their limitations, and the alternatives available to encourage more effective administration to meet public and private demands. (Fall)

243 **Land Use Planning and Community Development (3)** Staff

Theory and practice of land use planning. Issues of competing land uses in an era of increased sprawl, population pressure, and environmental threat. Growth management techniques and practices in states and localities; the use of various regulatory controls and economic incentives to achieve desired outcomes. The idea of “sustainable community.” (Spring)

248 **Financing State and Local Government (3)** Staff

Analysis of the theory and practice of public finance in state and local governments. Includes the financing of services through municipal taxation, intergovernmental

funds, debt instruments, and other revenue sources. Review of expenditures as well as financial management practices. (Spring)

249 **Urban and Regional Policy Analysis (3)** Cropp

Examination of selected national policies and their effects on urban areas and governments. Emphasis on policy dimensions of urban systems and their relationship to the social, political, and economic context. Against the background of urban politics and administration, areas of health, education, welfare, manpower, transportation, and housing are addressed. (Spring)

251 **Governmental Budgeting (3)** Joyce

Survey of the actors, institutions, and processes in the federal budgeting system. Executive budget preparation/execution, legislative review and approval of budget requirements, and independent audit of government spending. (Fall)

253 **Financial Management in the Public Sector (3)** Staff

Intensive analysis, using the case study approach, of concepts and principles used in the not-for-profit sector for financial management purposes. Disciplines of accounting, budgeting, operations control, management, and auditing are integrated into comprehensive management control systems and include issues of system design and implementation. (Spring)

254 **Public Budget and Tax Policy (3)** Staff

Policy tools available to pursue social objectives, including grants, loans, contracting out, regulation, tax credits, and tax expenditures. Focus on criteria such as effectiveness, efficiency, equity, legitimacy, and administrative ease. (Summer)

255 **Contracting Out and Public–Private Partnerships (3)** Staff

- Contracting out and public–private partnerships as methods of delivering government goods and services. Policy and implementation issues, including when and how contracting out may provide a more efficient and effective method of delivering government goods and services.
- 260 **Policy Formulation and Administration (3)** Staff
- Impact of economic and political factors on public policy formulation and implementation; intensive analysis of the analytical, normative, and decision-making models of the policy process with special emphasis on their relationship to current policy problems. (Summer)
- 264 **Public and Nonprofit Program Evaluation (3)** Newcomer
- Theory and practice of program evaluation and evaluative research. Exploration of scope and limitations of current practice in evaluation, considering economic, political, social, and administrative factors. Examination of methodological considerations for design, data collection, analysis, and dissemination.
- Prerequisite: PPol/PAd 202 or equivalent. (Spring)
- 266 **Environmental Policy (3)** Staff
- Current issues in environmental policy: biodiversity, land use including wilderness protection, climate change, environmental justice, economic growth, and ecological sustainability.
- 267 **Current Topics in Public Policy (1 to 3)** Staff
- Critical analysis of topical issues in public policy, using a case-study approach.
- Specific issues covered will vary. (Fall, spring, and summer)
- 297 **Practicum in Public Policy and Public Administration (0)**

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| 298 | Directed Readings and Research (3) | Staff |
| | Supervised reading in selected fields within public administration. Admission by permission of instructor. May be repeated once for credit. | |
| 311 | Seminar: Public–Private Sector Institutions and Relationships (3) | Staff |
| | Same as SMPP 311. | |
| 323 | Seminar: The Policy Organization (3) | Staff |
| | Unique problems of complex organizations: public, private, and mixed. Emerging concepts and theories. Selected issues. | |
| 373 | Seminar: Public Administration and American Political and Social Institutions (3) | Staff |
| | Contemporary and historical literature in the institutional and intellectual development of public administration. (Spring) | |
| 374 | Seminar: Public Organization Theory (3) | Harmon |
| | Survey of contemporary normative and epistemological issues in public organization theory and practice. Analysis of the past and present influence of logical positivism, behaviorism, pragmatism, humanism, existentialism, phenomenology, and postmodernism. (Fall) | |
| 393 | Current Topics and Research (1) | Staff |
| | Current scholarship discussed in a seminar setting. The conduct of research and presentation of research findings. May be repeated for credit. | |
| 395 | Research Methods (3) | Adams, Newcomer |

Doctoral seminar on theory and practice in research methodology. Data sources and gathering, research models and designs. Critical evaluation of research studies.

Emphasis on application of research methods to policy questions. (Spring)

397 **Doctoral Seminar** (1 to 3)

Staff

RELIGION

University Professor S.H. Nasr

Professors H.E. Yeide, Jr., D.D. Wallace, Jr., A.J. Hildebeitel (*Chair*), P.B. Duff, R.J. Eisen

Assistant Professors K. Pemberton, E. Aviv

Master of Arts in the field of Hinduism and Islam—Through its Department of Religion, GW participates in this Consortium of Universities program. The degree requires 36 credit hours, of which a majority must be taken at GW. Candidates must meet the general requirements of Columbian College of Arts and Sciences, including the Master's Comprehensive Examination. Complete information on the program is available from the Department of Religion.

Doctor of Philosophy in the field of American religious history—See History.

With permission, a limited number of 100-level courses in the department may be taken for graduate credit; additional course work is required. See the Undergraduate Programs Bulletin for course listings.

201 **Special Topics in Religion** (3)

Staff

May be repeated for credit provided the topic differs.

249 **Myth, Ritual, and Language** (3)

Hildebeitel

Method and theory in the interpretation of myth and narrative, ritual and sacrifice, and symbolism, with primary reference to the history of religions.

257 **India's Great Epics** (3)

Hildebeitel

The *Mahabharata* and the *Ramayana* are treated in alternate offerings of the course.

These founding epic texts of devotional (bhakti) Hinduism are taught in English translation. Vernacular and performative versions of the epics and Western adaptations.

258 **Currents of Modern Hinduism (3)** Hiltebeitel

Hinduism since the early seventeenth century. Colonialism, the impact of missionaries, orientalism, reform, relations between Brahmanical and popular Hinduism, Sanskrit and vernacular traditions, regionalism, communalism, nationalism, fundamentalism, politicized “syndicated” Hinduism, and secularism.

260 **Topics in the Study of Islam (3)** Nasr

Study of sources and approaches to the investigation of Islam by both Western Islamicists and Muslim scholars, with discussion of the main controversial issues and differences in methods used by various schools of scholarship. Prerequisite: A course on Islam or permission of instructor.

261 **Topics in Islamic Thought (3)** Nasr

Perennial major issues in Islamic theology, philosophy, and Sufism such as Divine Unity, prophetology, eschatology, religious knowledge, sacred law, and ethics.

Prerequisite: A course on Islam or permission of instructor.

271 **American Religion to 1830 (3)** Wallace

Religious thought and life during the Colonial and early National periods.

273 **American Religion Since 1830 (3)** Wallace

Religious thought and life from the Civil War to the present.

291–92 **Readings and Research (3–3)** Staff

Investigation of special problems.

299–300 **Thesis Research** (3–3)

SOCIOLOGY

University Professor A. Etzioni

Professors P.H.M. Lengermann (*Research*), W.J. Chambliss, S.A. Tuch (*Chair*), R. Weitzer, R.J.

Cottrol, G.D. Squires

Associate Professors H. Nashman, C. Deitch, C.E. Kubrin, I. Kennelly, R. Whitaker

Assistant Professors D.S. Eglitis, F. Buntman, L. Torres, H. Ishizawa

Professorial Lecturers R.B. Zamoff, M. Mashayekhi

Lecturers M. Wenger, L. Joseph

Master of Arts in the field of sociology—Prerequisite: a bachelor's degree with a major in sociology or in an approved related field.

Required: the general requirements stated under Columbian College of Arts and Sciences. All students must complete at least 30 credit hours of graduate course work plus a thesis (Soc 299–300). The following courses are required for the degree: Soc 230, 231, 238, 239, and either 232 or 240; plus two courses in a major field and one course in a minor field. Currently available fields of specialization are criminology, social stratification, and urban sociology. With the consent of an advisor, one graduate course in a related department or program can be used for either one of the major courses or for the minor course requirement. No more than 3 credits of Soc 295 may be applied toward degree requirements.

Master of Arts in the field of criminology—This program is a joint offering of the Department of Sociology and the Department of Forensic Sciences. Prerequisite: a bachelor's degree in criminal justice, criminology, or a related field.

Required: the general requirements stated under Columbian College of Arts and Sciences.

All students must complete at least 30 credit hours of graduate course work plus a thesis (Soc 299–300) or 36 credit hours of graduate course work and a comprehensive examination. The following courses are required for the degree: Soc 230, 231, 258, 259, and either Soc 232 or 240; ForS 221, 222; five elective courses in criminal justice, of which at least one is in forensic sciences and at least one is chosen from Soc 260, 261, 262, 263, 264, 266. Students opting for a thesis substitute Soc 299–300 for two of the elective courses.

With permission, a limited number of 100-level courses in the department may be taken for graduate credit; additional course work is required. See the Undergraduate Programs Bulletin for course listings.

- 230 **Sociological Research Methods (3)** Kubrin, Tuch, Torres, Ishizawa
Survey of the procedures, methods, and problems of contemporary sociological data collection, with an emphasis on survey methods. Major topics include research design, instrument construction, survey sampling, and measurement. (Fall)
- 231 **Data Analysis (3)** Tuch, Ishizawa
Intensive study of quantitative data analysis techniques, with strong emphasis on computer applications. Prerequisite: Soc 230. (Spring)
- 232 **Qualitative Methodology:
Doing Field Research (3)** Chambliss, Weitzer, Torres
Practical application of data collection methods in natural settings; observation, participant observation, and field experience. Emphasis on implementing research projects by using these methods for purposes of developing empirically grounded theory. (Fall)

- 238 **Development of Sociological Theory (3)** Chambliss, Kennelly, Eglitis
Development of sociology from the early 1800s to the 1920s. Intensive analysis of the classical theoretical statements. (Fall)
- 239 **Contemporary Sociological Theory (3)** Kennelly, Eglitis
Intensive examination and evaluation of contemporary schools of sociological theory in Europe and America. Advanced analysis of theoretical perspectives. (Spring)
- 240 **Field Research in Organizational Settings (3)** Staff
Applications of field research techniques in formal organizational settings.
Examination of the logic of qualitative inquiry and techniques of qualitative data collection. Intensive interviewing and participant observation in field settings are emphasized. (Fall)
- 244 **Sociology of Families and Kinship (3)** Staff
A systematic introduction to recent theoretical perspectives and empirical research on family patterns. The course combines a focus on how and why societal family patterns vary and change over time with an examination of how individuals vary in their experience of life course transitions, such as marriage, childbirth, employment, divorce, and retirement. (Fall)
- 245 **Race Relations (3)** Tuch, Squires, Torres
Systematic analysis of race relations and inequality, primarily in the United States.
Topics include current status and recent trends in inequality, the institutional and organizational patterning of discrimination, the structure of racial attitudes, theoretical perspectives on race relations, and selected policy issues. (Spring)
- 246 **Comparative Race and Ethnicity (3)** Weitzer

- Examination of race and ethnic relations in comparative, international perspective. Selected societies are analyzed in terms of patterns of racial and ethnic inequality, intergroup relations, institutional foundations of discrimination, social control systems, and sources of social change. (Spring)
- 248 **Race and Urban Redevelopment** (3) Squires
- An examination of sociological forces shaping the development of metropolitan areas, racial inequality, and the intersections of urban development and race relations. Major theories of urban and metropolitan development and causes of racial inequality; major past and current public policies.
- 250 **Urban Sociology** (3) Squires, Ishizawa
- Systematic analysis of urbanization and life within urban areas, primarily in the United States. Topics include theoretical perspectives on urban growth and neighborhood change, housing, the community question, neighborhood effects on individuals within the metropolis, and selected policy issues.
- 252 **Selected Topics** (3) Staff
- Examination of selected topics of general importance to sociology. May be repeated once for credit. (Fall and spring)
- 254 **Evaluation Research** (3) Staff
- Systematic survey of the conceptualization, design, and practice of evaluation research. Prerequisite: Soc 230. (Spring)
- 255 **Practicum in Applied Research** (3 or 6) Staff
- Supervised sociological research through an internship in a local organization (e.g., a government agency, a non-governmental organization, or a research firm). The

internship must be for at least 10 hours a week. Weekly seminar; final paper.

Prerequisite: completion of all methodology requirements for the M.A. degree.

(Fall, spring, and summer)

258 **Deviance and Control (3)** Kubrin, Weitzer

Examination of major theories and research in the field of deviance and social control, with special emphasis on recent empirical advances and comparative perspectives. (Fall)

259 **Criminology (3)** Kubrin, Chambliss, Weitzer, Buntman

The status of various criminology theories. Theories of crime causation and crime control; cross-cultural research on crime. (Spring)

260 **Special Topics in Criminal Justice (3)** Chambliss, Kubrin, Weitzer, Buntman

Examination of selected topics in criminal justice. May be repeated once for credit if the topic differs. (Fall and spring)

261 **Sociology of Law (3)** Chambliss, Buntman

The development and use of law in complex societies, including the different roles of civil and criminal law. The role of the sociology of law within the discipline of sociology. (Spring)

262 **Corrections (3)** Buntman

Analysis of adult and juvenile correctional systems, including probation, parole, jails, and prisons. Topics include theoretical perspectives, the impact of corrections on crime rates, and evaluations of sentencing and other reforms. (Spring)

263 **Race and Crime (3)** Kubrin, Weitzer, Buntman

- Examination of race, crime, and punishment in American society. Analysis of competing theoretical explanations for interracial differences in crime rates, and racial patterns in the apprehension, adjudication, and punishment of offenders. (Fall)
- 264 **Organized Crime** (3) Chambliss
- The role of organized crime in the political economy of different countries, with emphasis on the development of organized crime networks in the United States. (Spring)
- 265 **Women, Welfare, and Poverty** (3) Deitch
- Same as WStu 265.
- 266 **Gender and Criminal Justice** (3) Buntman
- How understandings, practices, and theories of gender shape the workings of criminal justice systems, including issues of criminality and responses to crime, victimization and violence, and definitions of illegal behaviors. Same as WStu 266.
- 268 **Race, Gender, and Class** (3) Deitch, Kennelly, Torres
- How social structures are constructed through race, gender, and class and how they shape experience. The intersections of race, gender, and class in education, science, politics, labor markets, and social welfare policies. Same as WStu 268. (Spring)
- 271 **Gender and Society** (3) Kennelly, Eglitis, Torres
- An examination of theory and research in the field of gender, with emphasis on current empirical research. (Fall)
- 273 **The Sex Industry** (3) Weitzer

Sociological examination of prostitution, pornography, and other forms of sex work in the United States and internationally. Topics include theoretical perspectives, structure of the sex industry, workers' experiences, gender issues, political conflicts, and policy implications. (Spring)

286 **The Law of Race and Slavery (3)** Cottrol

Same as Hist 286.

290 **Principles of Demography (3)** Staff

Same as Econ/Geog/Stat 290.

291 **Methods of Demographic Analysis (3)** Staff

Same as Econ/Geog/Stat 291.

295 **Research (arr.)** Staff

Independent study and special projects. Before permission is granted to register for Soc 295, the student must submit a written plan of study for the approval of the staff member of the department who will be directing the research. May be repeated once for credit but to no more than a total of 6 credits. (Fall, spring, and summer)

299–300 **Thesis Research (3–3)** Staff

SPECIAL EDUCATION

See **Teacher Preparation and Special Education.**

SPEECH AND HEARING SCIENCE

Professors C.W. Linebaugh, G.M. Schulz

Associate Professors M.D.M. Brewer (*Interim Chair*), S. Brundage

Assistant Professors N.S. Richards, F. Subiaul, A.B. Hancock

Professorial Lecturers M. Bamdad, B. Sonies

Clinical Instructors L. Jacobs-Condit, I. Jackson, L. Siefriedt

Master of Arts in the field of speech–language pathology—Prerequisite: the degree of Bachelor of Arts with a major in speech and hearing science from this University, or an equivalent degree, and an appropriate score on the Aptitude Test of the Graduate Record Examination.

Required: the general requirements stated under Columbian College of Arts and Sciences. The program of study consists of 40 credit hours of approved course work without a thesis or, with the approval of the department, 34 credit hours of approved course work plus a thesis (SpHr 299–300). All students must satisfy the academic and supervised practicum requirements of the Certificate of Clinical Competence awarded by the American Speech–Language–Hearing Association and satisfactorily complete the Master’s Comprehensive Examination.

As one component of the Master’s Comprehensive Examination, all students must take the National Examination in Speech Pathology available through the Educational Testing Service. Students must request the Testing Service to send copies of test scores to the Department of Speech and Hearing Science to be used in partial fulfillment of the general requirement in Columbian College for the Master’s Comprehensive Examination. Test results must reach the department at least three weeks before graduation.

With permission, a limited number of 100-level courses in the department may be taken for graduate credit; additional course work is required. See the Undergraduate Programs Bulletin for course listings.

201 Clinical Practicum in Speech–Language Pathology (1 to 6)

Bamdad

Supervised clinical practice in the evaluation and treatment of speech and language disorders; counseling of clients and families; development of treatment plans and

writing of evaluation and progress reports. Admission by permission of the instructor.

May be repeated for up to 6 credit hours. (Fall, spring, and summer)

202 Clinical Practicum in Audiology (1 to 6) Bamdad

Supervised clinical practice in behavioral and electrophysiologic assessment of hearing, hearing aid assessment and fitting, and aural rehabilitation; counseling clients and families; writing evaluation and progress reports. Admission by permission of the instructor. May be repeated, but may not be taken for more than 6 credit hours.

(Fall, spring, and summer)

210 Research in Communication Sciences and Disorders (3) Brundage

Review of fundamental issues and methods in clinical research, including group and single-subject experimental designs. Application of clinical research methodology and findings to assessment and treatment. Development of a research prospectus.

Laboratory fee. (Spring)

220 Disorders of Articulation and Phonology (3) Staff

Survey of the nature and causes of impairments of speech sound production in children and adults. Differential diagnosis of oral motor versus phonological disorders; treatment approaches; identification and modification of regional dialects and foreign accents. Laboratory fee. (Spring)

221 Neurodevelopmental Disorders of Speech Production (2) Staff

Evaluation and treatment of infants and children with neurodevelopmental speech disorders, including cerebral palsy. Emphasis on management of prespeech oral motor and feeding impairments. Laboratory fee. (Summer)

- 222 **Acquired Neuromotor Disorders of Speech Production (2)** Staff
Examination of the neuroanatomical and neurophysiological bases and acoustic and perceptual characteristics of acquired dysarthrias and apraxia of speech. Evidence-based approaches to the assessment, differential diagnosis, and treatment of these disorders. Laboratory fee. (Summer)
- 230 **Pediatric Language Impairments (3)** Staff
Survey of current approaches for assessing and treating language delays and disorders in infants, toddlers, preschoolers, school-age children, and adolescents. Review of standardized, observational, and ethnographic approaches used in language assessment; current models of intervention and service delivery. Laboratory fee. (Fall)
- 240 **Neurogenic Communication Disorders (3)** Brundage
Differential diagnosis of acquired speech and language disorders, with an emphasis on the aphasia acquired in adulthood. Evidence-based approaches to the assessment and treatment of adult neurogenic language disorders. Laboratory fee. (Fall)
- 241 **Applied Neuroanatomy (3)** Bamdad
Neuroanatomy and neurophysiology of systems underlying speech, language, and hearing. Neuroimaging techniques and investigations. Applications to the assessment and treatment of communication disorders. Laboratory fee. (Fall)
- 251 **Seminar: Speech Fluency Disorders (3)** Brundage
Consideration of stuttering and other disorders of speech rate and rhythm from developmental, linguistic, physiological, and psychosocial points of view. Investigation of evidence-based approaches to assessment and treatment. (Summer)

- 260 **Voice Disorders: Evaluation and Treatment (3)** Hancock
Normal anatomy and physiology of the human vocal mechanism. Nature, causes, and clinical management of functional and organic voice disorders, including laryngectomy. Laboratory fee. (Fall)
- 276 **Aural Rehabilitation (3)** Brewer
Habilitation/rehabilitation of the hearing impaired, including auditory training, speech reading, hearing aids, assistive listening devices, communication strategies, and counseling. Laboratory fee. (Fall)
- 277 **Psychoeducational Management of Children With Hearing Impairment (3)** Brewer
Study of the psychosocial and educational effects of hearing loss. Assessment, remediation, and management approaches related to the education of the hearing impaired. Laboratory fee. (Summer)
- 281 **Dysphagia (2)** Sonies
Anatomy and physiology of normal swallowing. Nature and causes of dysphagia in adults. Assessment, including clinical examination and radiologic methods; treatment. Laboratory fee. (Spring)
- 282 **Augmentative Communication and Computer Applications in Communication Disorders (2)** Staff
Principles of assessment, development, and selection of augmentative and alternative communication systems; application through case studies. Computer applications, including review of selected hardware and software and selection criteria. Laboratory fee. (Summer)

283 **Multicultural Perspectives in Communication** Staff

Development and Disorders (3)

Application of culturally appropriate and theoretically based speech and language procedures to clinical assessment and intervention with multilingual/ multicultural populations. (Spring)

290 **Selected Topics in Clinical Audiology (1 to 3)** Staff

Advanced study of selected theoretical and clinical issues. May be repeated, but may not be taken for more than a total of 6 credits. (Fall, spring, and summer)

291 **Selected Topics in Speech–Language Pathology (1 to 3)** Staff

Advanced study of selected theoretical and clinical issues regarding various aspects of practice in speech–language pathology. May be repeated but not for more than a total of 6 credit hours. (Fall, spring, and summer)

295 **Independent Research in Speech, Language, and Hearing (arr.)** Staff

299–300 **Thesis Research (3–3)** Staff

STATISTICS

Professors J.L. Gastwirth, N.D. Singpurwalla, J.M. Lachin III, H.M. Mahmoud, T.K. Nayak, Z.

Li, J. Chandra (*Research*), R. Modarres (*Chair*)

Associate Professors S. Bose, E. Bura

Assistant Professors S. Kundu, S. Balaji, Y. Lai, Q. Pan, J.R. Stroud

Professorial Lecturers F. Ponti, P. Chandhok, R.F. Teitel, C.M. Fleming

Lecturer H. Modarres

Master of Science in the field of statistics—General prerequisite: course work in multivariate calculus, matrix theory, and at least two undergraduate statistics courses.

Required: The general requirements stated under Columbian College of Arts and Sciences. The program of study consists of 30 credit hours of graduate course work without a thesis. The department may also approve a program of study consisting of 24 credit hours of course work plus a thesis (Stat 299–300). All candidates must take Stat 201–2. Courses may be chosen in related fields (economics, mathematics, finance, management, computer science, engineering, public health) with approval of the advisor.

Doctor of Philosophy in the field of statistics—Prerequisite: A master's degree in statistics or a related discipline. The main requirement is a strong background in mathematics, including courses in advanced calculus, linear algebra, and mathematical statistics. Some deficiencies may be made up concurrently during the student's first year. In some instances, a student may enter the Ph.D. program with a bachelor's degree.

Required: The general requirements stated under Columbian College of Arts and Sciences, including satisfactory completion of (1) Stat 201–2, 217–18, 223 or 271, 257, 258, 263, 264, and at least two courses chosen from among Stat 262, 265–66, and 273–74; (2) a minimum of 15 additional credit hours as determined by consultation with the departmental doctoral committee; (3) the General Examination, consisting of two parts: (a) a written qualifying examination that must be taken within 24 months from the date of enrollment in the program and is based on Stat 201–2, 257, and 263 and (b) an examination to determine the student's readiness to carry out the proposed dissertation research; and (4) a dissertation demonstrating the candidate's ability to do original research in one of the following fields: Bayesian inference, biostatistics, design of experiments, multivariate analysis, nonparametric statistics, probability (theoretical or applied), reliability theory, robust methods, sampling, statistical computing, statistical inference, stochastic processes, and time series.

Master of Science and Doctor of Philosophy in the fields of biostatistics and epidemiology—

See Biostatistics and Epidemiology.

In addition to its degree programs, the Statistics Department offers a graduate certificate in survey design and data analysis.

With permission, a limited number of 100-level courses in the department may be taken for graduate credit; additional course work is required. See the Undergraduate Programs Bulletin for course listings.

201–2 **Mathematical Statistics (3–3)** Balaji, Mahmoud

Probability, distribution theory, sampling theory, estimation, sufficient statistics, hypothesis testing, analysis of variance, multivariate normal distribution. Prerequisite: Math 33, 84. (Academic year)

207 **Methods of Statistical Computing I (3)** Modarres

Error analysis, computational aspects of linear models, sweep operator, random number generation, simulation, resampling. Optimization, numerical integration (Gaussian quadrature, Simpson's rule); E–M algorithm. Prerequisite: Stat 118, 157–58; Math 84; knowledge of a programming language.

208 **Methods of Statistical Computing II (3)** Modarres

Numerical linear algebra, matrix decomposition and eigenvalue problems. Smoothing and density estimation. Graphics, interactive and dynamic techniques for data display. Object-oriented programming. Prerequisite: Stat 118, 157–58; Math 84; and knowledge of a programming language.

210 **Data Analysis (3)** Lai

- Review of statistical principles of data analysis, using computerized statistical procedures. Multiple regression and the general linear model, analysis of contingency tables and categorical data, logistic regression for qualitative responses. Prerequisite: Stat 118, 157 or 201, and 183 or equivalent. (Spring)
- 213 **Intermediate Probability and Stochastic Processes (3)** Li
- Discrete and continuous random variables and their distributions, conditional distributions and conditional expectation, generating functions and their applications, convergence of random variables; introduction to Brownian motion, homogeneous and nonhomogeneous Poisson processes and martingales. Prerequisite: Stat 201–2 or equivalent. (Spring, alternate years)
- 214 **Applied Linear Models (3)** Bura
- Introduction to regression techniques for discrete and continuous response variables. The course includes a computing component using SAS and S⁺. Prerequisite: Math 33 and 84. (Fall, alternate years)
- 215–16 **Applied Multivariate Analysis (3–3)** Modarres
- Application of multivariate statistical techniques to multidimensional research data from the behavioral, social, biological, medical, and physical sciences. Prerequisite: Stat 119, 157–58; Math 84. (Alternate academic years)
- 217 **Design of Experiments (3)** Bura, Li
- Design and analysis of single- and multiple-factor experiments. Includes block designs, repeated measures, factorial and fractional factorial experiments, response surface experimentation. Prerequisite: Stat 157–58; Math 84. (Fall, alternate years)
- 218 **Linear Models (3)** Kundu

- Theory of the general linear parametric model. Includes least squares estimation, multiple comparisons procedures, variance components estimation. Prerequisite: Stat 201–2; Math 84. (Spring, alternate years)
- 221 **Design of Experiments for Behavioral Sciences (3)** Staff
Applications of advanced experimental design to research problems in behavioral sciences and education. Prerequisite: Stat 105 or 118 or equivalent and permission of instructor. Not open to graduate students in mathematical statistics. (Spring)
- 223 **Bayesian Statistics: Theory and Applications (3)** Singpurwalla, Bose
An overview of Bayesian statistics, including its foundational issues, decision under uncertainty, linear models, expert opinion, and computational issues. Prerequisite: Stat 201–2. (Spring, alternate years)
- 226 **Advanced Biostatistical Methods (3)** Li, Pan
Statistical methods for the analysis of longitudinal data: nonparametric, fixed effects, mixed effects, generalized estimating equations. Methods for the analysis of emerging data: group sequential analysis, Brownian motion, Bayesian methods, and stochastic curtailment. Other advanced topics of current research in biostatistics. Prerequisite: Stat 201–2 or permission of instructor. (Spring)
- 227 **Survival Analysis (3)** Li, Pan
Parametric and nonparametric methods for the analysis of events observed in time (survival data), including Kaplan–Meier estimate of survival functions, logrank and generalized Wilcoxon tests, the Cox proportional hazards model and an introduction to counting processes. Prerequisite: Stat 201–2 or permission of instructor. (Fall)
- 231 **Categorical Data Analysis (3)** Kundu

- A study of the theoretical bases underlying the analysis of categorical data. Measures and tests of association; Mantel-Haenszel procedure; weighted least squares and maximum likelihood estimators in linear models; estimating equations; logistic regression; loglinear models. Prerequisite: Stat 201–2. (Fall, alternate years)
- 233 **Questionnaire Design (3)** Staff
- Questionnaire development from the perspective of cognitive techniques.
- Questionnaire issues range from choosing the mode of data collection (mail, telephone, or in-person) to selecting the respondent to the differences between asking attitude and factual questions. Pretesting the instrument chosen.
- 238 **Survey Management (3)** Staff
- Tools used in the management of a survey operation from the initial customer contacts through training, fieldwork, data processing, data analysis, report writing, and presentation of results. Issues in budgeting, staffing, and scheduling, with emphasis on quality management. (Fall)
- 242 **Regression Graphics/Nonparametric Regression (3)** Bura
- Linear regression, nonparametric regression, smoothing techniques, additive models, regression trees, neural networks, and dimension reduction methods. Prerequisite: Stat 118; Math 33, 84, or equivalent. (Spring, alternate years)
- 257 **Probability (3)** Balaji, Mahmoud
- Probabilistic foundations of statistics, probability distributions, random variables, moments, characteristic functions, modes of convergence, limit theorems, probability bounds. Prerequisite: Stat 201–2, knowledge of calculus through functions of several variables and series. (Fall)

- 258 **Distribution Theory** (3) Gastwirth, Mahmoud
Special distributions of statistics, small and large sample theory, order statistics, and spacings. Prerequisite: Stat 257. (Spring)
- 259 **Advanced Probability** (3) Mahmoud
Conditional expectation and martingales; weak convergence in general metric spaces and functional central limit theorems for i.i.d. random variables and martingales; applications to biostatistics. Prerequisite: Stat 257 or an equivalent measure-theoretic introduction to probability.
- 262 **Nonparametric Inference** (3) Kundu
Inference when the form of the underlying distribution is unspecified. Prerequisite: Stat 201–2.
- 263 **Advanced Statistical Theory I** (3) Nayak, Bose
Decision theoretic estimation, classical point estimation, hypothesis testing. Prerequisite: Stat 201–2. (Fall)
- 264 **Advanced Statistical Theory II** (3) Nayak, Bose
Asymptotic theory, hypothesis testing, confidence regions. Prerequisite: Stat 257, 263. (Spring)
- 265 **Multivariate Analysis** (3) Nayak, Modarres
Multivariate normal distribution. Hotelling's T^2 and generalized T^2_0 , Wishart distribution, discrimination and classification. Prerequisite: Stat 201–2. (Fall, alternate years)
- 271 **Foundational and Philosophical Issues in Statistics** (3) Singpurwalla

Axiomatic underpinnings of Bayesian statistics, including subjective probability, belief, utility, decision and games, likelihood principle, and stopping rules. Examples from legal, forensic, biological, and engineering sciences. Students are expected to have a background in computer science, economics, mathematics, or operations research. Prerequisite: Stat 201–2.

273–74 **Stochastic Processes** (3–3) Mahmoud, Singpurwalla

Fundamental notions of Markov chains and processes, generating functions, recurrence, limit theorems, random walks, Poisson processes, birth and death processes, applications. Prerequisite: Stat 201–2. (Alternate academic years)

275 **Econometrics I** (3) Staff

Same as Econ 375.

276 **Econometrics II** (3) Staff

Same as Econ 376.

281 **Advanced Time Series Analysis** (3) Stroud

Autoregressive integrated moving average (ARIMA) modeling and forecasting of univariate and multivariate time series. Statespace or Kalman filter models, spectral analysis of multiple time series. Theory and applications using the University computer. Prerequisite: Math 33, Stat 201–2 or equivalent. (Spring)

287–88 **Modern Theory of Sample Surveys** (3–3) Chandhok

Application of statistical theory to the sampling of finite populations. Simple, stratified, cluster, double and subsampling. Special topics, including super-populations and randomized response. Prerequisite: Stat 157–58 or equivalent. (Academic year)

289	Seminar (3)	Staff
	Admission by permission of instructor.	
290	Principles of Demography (3)	Staff
	Same as Econ 290.	
291	Methods of Demographic Analysis (3)	Staff
	Same as Econ 291.	
295	Reading and Research (3)	Staff
	May be repeated once for credit.	
299–300	Thesis Research (3–3)	Staff
398	Advanced Reading and Research (arr.)	Staff
	Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.	
399	Dissertation Research (arr.)	Staff
	Limited to Doctor of Philosophy candidates. May be repeated for credit.	

STRATEGIC MANAGEMENT AND PUBLIC POLICY

Professors H.J. Davis, W.H. Becker, D.J. Lenn, M. Starik (*Chair*), T.L. Fort

Associate Professors J.B. Thurman, J.W. Cook, E.J. Englander, J.H. Beales III, L. Burke, J.J.

Griffin, B.S. Teng, J. Rivera

Assistant Professor D.R. Kane

Professorial Lecturer W.N. LaForge

See the School of Business for programs of study in business administration leading to the degrees of Master of Business Administration and Doctor of Philosophy.

202	Business–Government Relations (3)	Englander, Becker
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Historical and philosophical foundations of the business–government relationship.

Regulation, international trade, and corporate political activities. Public policy issues facing business and the business community’s political response. Prerequisite: MBAd 260 or equivalent. (Fall)

205 Business Representation and Lobbying (3) Staff

Strategies, tactics, and techniques used by business in representing itself to the legislative and executive branches and regulatory agencies of the federal government. Legal and practical constraints. Ethical considerations. (Spring)

206 Applied Microeconomics (3) Beales and Staff

Applications of economic theory to public and private decisions with emphasis on public policy analysis. Focus on market structure and its implications. Imperfect information, common property, public goods and externalities. Economic analysis of government behavior and legal institutions. Prerequisite: Econ 217 or 219 and MBAd 220 or equivalent. (Fall)

207 Environment, Energy, Technology, and Society (3) Starik

Same as PPol 207.

208 Macroeconomic Policy and Business (3) Staff

Determination of national income, employment, inflation, and interest rates. The role of expectations in the economy. Impact of government purchases, tax policy, and deficits. Monetary policy institutions. The global economy and exchange rates. Prerequisite: Econ 218 or 219 and MBAd 220 or equivalents. (Fall)

209 Seminar: Business Economics and Public Policy (3) Englander, Becker

- Analysis and discussion of selected issues by students and representatives of government and business. Prerequisite: SMPP 202 or MBAd 260 or equivalent. (Spring)
- 210 **Strategic Environmental Management (3)** Starik
- Examination and analysis of the orientation and actions of private, public, and nonprofit sectors in relation to their natural environments. Emphasis on organizational interaction and effectiveness, particularly regarding business firms and industry, on issues of environmental quality and sustainability. (Spring)
- 213 **Management of Strategic Issues (3)** Staff
- The body of management theory and practice that has evolved to identify, analyze, and resolve strategic organizational issues. Methodology of the field; applications to critical issues in labor relations, energy and pollution, marketing and consumerism, business–government relations, and the global economy.
- 214 **Consultative Processes (3)** Staff
- Same as Mgt/TStd 214.
- 290 **Special Topics (1 to 3)** Staff
- Experimental offering; new course topics and teaching methods. May be repeated once for credit.
- 291 **Ethics and Business (3)** Lenn, Starik, Fort
- An in-depth, comprehensive exploration, analysis, and evaluation of specific for profit and non-profit organization values, approaches, and outcomes related to multiple ethical ideals, systems, and practices. (Spring)
- 293 **American Business History (3)** Becker

- The history of American business institutions in manufacturing, distribution, transportation, and finance. Particular attention will be given to the period since industrialization, with consideration of business institutions in their economic, legal, governmental, and social contexts. Same as Hist 220. (Fall)
- 297 **International Management Experience (3)** Staff
Same as Accy/Fina/IBus/Mgt/Mktg 297. May be repeated for credit.
- 298 **Directed Readings and Research (3)** Staff
Supervised readings or research. Admission by prior permission of instructor. May be repeated once for credit. (Fall and spring)
- 299 **Thesis Seminar (3)** Staff
- 300 **Thesis Research (3)** Staff
- 311 **Seminar: Public–Private Sector Institutions and Relationships (3)** Staff
An analysis and critique of alternative theoretical frameworks for describing, understanding, and predicting the nature, values, and actions of American public and private institutions. Problems, potentials, and alternatives for structuring public and private institutional arrangements to meet the needs of society. Prerequisite: doctoral degree candidate status. (Fall and spring)
- 321 **Seminar in Strategic Management (3)** Staff
Develops understanding of the major research streams in strategic management; exposure to theoretical research frameworks and methodological issues and approaches.
- 331 **Seminar in Business and Public Policy (3)** Staff

Develops understanding of the major research streams in business and public policy; exposure to theoretical research frameworks and methodological issues and approaches.

391 **Seminar: Business Management (3)** Staff

Examination of major current issues, both theoretical and empirical, affecting the development of the business enterprise. Topics to be announced. Emphasis on policy and strategic issues affecting the total enterprise. (Offered as the demand warrants)

397 **Doctoral Seminar (1 to 3)** Staff

398 **Advanced Reading and Research (arr.)** Staff

Limited to doctoral candidates preparing for the general examination. May be repeated for credit.

399 **Dissertation Research (arr.)** Staff

Limited to doctoral candidates. May be repeated for credit.

TEACHER PREPARATION AND SPECIAL EDUCATION

Professors J.R. Shotel, M.S. Castleberry, R.N. Ianacone, A.J. Mazur, M.B. Freund, L.L. West, J.M. Taymans, N.B. Paley, C.A. Kochhar, S.J. Lynch, A.U. Chamot

Associate Professors S.S. Beck, M.H. Jarrett, C. Green, C.L. Pyke (*Chair*), P.S. Tate, N.B.

Milman, K. Kortecamp

Assistant Professors P.J. Leconte (*Research*), E.K. Rice, J. Ruoff (*Research*), B. Casemore, C.

Parker (*Research*), K. Ihrig (*Research*), J. Comas

Professorial Lecturers J.L. Embich, G. Oran, S. King, J. Illera, C. Wallin, K. Tindle, C.

Weidenthal, D. Bello, C. Ohlson, K. Spencer

Lecturers A. Biggins, W. Peterson, P. Page, M. Davis

See the Graduate School of Education and Human Development for programs of study leading to the degrees of Master of Arts in Education and Human Development, Master of Education, and Doctor of Education.

TEACHER EDUCATION

Department prerequisite: A bachelor's degree from an accredited institution is prerequisite to all 200-level courses in teacher education.

204 Perspectives in American Education (3) Beck, Green, Milman

Historical and social development of education in the United States; evolution of American education related to the growth of the nation and the changing social order; examination of selected issues in contemporary education.

205 Foundations of Curriculum Development: K–12 (3) Paley, Green

For experienced teachers. Examination of the educational ideas of individuals and groups that have influenced American curriculum theory and practice from the Progressive era through the twentieth century. Comparisons of the issues, models, and principles that have guided curricular thought, development, and innovation.

(Summer)

206–7 Teaching and Learning (3–3) Beck, Kortecamp

An overview of the principles of teaching, learning, and related research. Explores ways of knowing, models of teaching, classroom management, and the dynamic nature of the teaching/learning process. Structured observations and microteaching labs are required. Material fee.

208 Development and Diversity (3) Green, Milman, Casemore

An examination of student diversity in relation to theories of human growth and development. Investigation of diverse student strengths and needs; the special needs population; the dynamics of inclusion; and intercultural issues related to the teaching/learning process. Material fee.

209 **Reading Children's Literature Across the Curriculum (3)** Tate

Participants read and analyze multicultural children's literature (from folktale to nonfiction) while simultaneously practicing discussion, dramatization, art, and writing response strategies suitable for involving all students and integrating literature across the school curriculum. (Spring)

211 **Elementary School Curriculum and Methods (3)** Beck, Green

A comprehensive block course with subsections in mathematics, science, language arts, and social studies. Integrated with TrEd 235. May be repeated for up to 15 credits; with permission, up to four blocks (to a total of 12 credits) may be taken in one semester. Admission by permission of advisor. Material fee. (Fall)

215 **Recent Developments in Teaching English (3)** Casemore

For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective teaching of English. Admission by permission of instructor. Material fee. (Summer)

216 **Recent Developments in Teaching Social Studies (3)** Staff

For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective teaching of social studies. Admission by permission of instructor. Material fee. (Summer)

217 **Recent Developments in Teaching Science (3)** Lynch

- For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective teaching of science. Admission by permission of instructor. Material fee. (Summer)
- 218 **Recent Developments in Teaching Mathematics (3)** Pyke
- For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective teaching of mathematics. Admission by permission of instructor. Material fee. (Summer)
- 219 **Recent Developments in Teaching Computer Science (3)** Milman
- Research techniques, materials, and innovative programs relating to the effective teaching of computer science. Prerequisite: TrEd 208, 244, 245, 291. Material fee.
- 220 **Selected Topics (arr.)** Staff
- Topics and fees announced in the Schedule of Classes.
- 221 **Developmental Reading: Emergent Literacy (3)** Mazur
- For educators interested in helping young children get a successful literacy start. Seminar discussions focus on research into the sociocultural context of early literacy development, the nature of emergent reading and writing behaviors, and implications for establishing “literate environment” preschool and kindergarten classrooms. (Fall and spring)
- 222 **Foundations of Reading Development (3)** Comas
- Basic theories and processes of reading acquisition and assessment; linguistic, cognitive, developmental, social, and affective bases of reading; influences of media, instructional strategies, including formal and informal assessment. (Fall)
- 223 **Reading Instruction in Content Areas:** Comas

Elementary, Intermediate, and Secondary Schools (3)

Emphasis on acquisition and continuing development of content literacy, including integrated methods, media, and teaching demonstrations. (Fall)

224 Diagnostic Teaching of Reading: K–6 (3) Comas

Classroom teaching and assessment strategies for elementary teachers; construction of informal traditional and non-traditional reading and writing tests; other instruments of evaluation; selecting and planning activities suitable to specific problems.

Prerequisite: at least one previous course in reading. (Spring)

226 Diagnostic Teaching of Reading in Secondary School (3) Comas

Application of instructional strategies and techniques presented in TrEd 223 and 224.

Construction of informal tests; administering, scoring, and interpreting informal and standardized tests; study and evaluation of materials; teaching strategies for on-grade students and for those with reading problems. (Spring)

227 Teaching Second Language Reading and Writing (3) Chamot

An emphasis on acquisition and continuing development of content literacy, including integrated methods, media, and teaching demonstrations geared toward second language learning requirements. Material fee. (Spring)

228 Instructional Areas in Elementary Education (3) Beck

Current trends and research in reading, language arts, social studies, mathematics, science, music, art and physical education.

229 Current Issues in Elementary Education (3) Beck

Identification, definition, and analysis of some of the most important problems facing the contemporary American elementary school.

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| 232 | Professional Internship in Middle School Education (3 to 6) | Lynch, Pyke, Kortecamp |
| | Supervised internship in middle schools; required seminar. Admission by permission of instructor. Material fee. (Fall and spring) | |
| 234 | Professional Internship in Secondary Education (3 to 6) | Lynch, Pyke, Kortecamp |
| | Supervised internship; required seminar. Admission by permission of instructor. Material fee. (Fall and spring) | |
| 235 | Professional Internship in Elementary Education (3 to 6) | Beck, Green, Tate |
| | Supervised internship; required seminar. Admission by permission of instructor. Material fee. (Fall and spring) | |
| 236 | Analysis of Teaching (3) | Rice |
| | Teaching viewed as a system; component aspects are examined with a view toward developing a critical method of analysis. Material fee. (Spring) | |
| 237 | Practicum in Early Childhood Education (3 to 6) | Staff |
| | Supervised professional activity in selected early childhood programs; seminar. Prerequisite: 12 credit hours in early childhood education and permission of instructor. (Fall and spring) | |
| 238 | Clinical Practicum in Reading (3 to 6) | Comas |
| | Supervised clinical experience, including observation and participation, in testing, tutoring, and teaching. Clients may include preschoolers through adults. Minimum of 120 clinic hours required. Admission by permission of instructor. Material fee. | |
| 239 | Practicum in Curriculum and Instruction (3 to 6) | Staff |

Supervised field experience in curriculum. Admission by permission of instructor.

Prerequisite: TrEd 205. (Fall and spring)

240 Teacher Leadership in Education (3) Staff

From the perspectives of educational theory and practice, the ideals and realities of contemporary public school teaching are viewed within a system of local, state, and federal organizations, with the goal of enhancing the role of teachers as

knowledgeable and effective leaders in their profession. Prerequisite TrEd 204, 208, or equivalent. Material fee. (Spring)

244 Educational Technology and Computer Literacy Methods (3) Milman

Computers and related technologies in educational settings. Using national technology standards for teachers as a framework, the course combines discussion of key issues related to technology in education, demonstration of technology-related instructional methods, and hands-on computer use and materials development.

Prerequisite: TrEd 206–7. Material fee.

TrEd 245 through 251 offer theoretical, curricular, and practical considerations for teaching the content area concerned. Each course requires a 30-hour field experience in a secondary classroom. Prerequisite: TrEd 206–7 and the approved certification course work in the content area (math through calculus in the case of TrEd 250). Material fee. Each course is offered in the fall semester.

245 Teaching Computer Science in Secondary Schools (3) Milman

246 Teaching English in Secondary Schools (3) Casemore

247 Teaching Science in Secondary Schools (3) Lynch, Parker

248 Teaching Social Studies in Secondary Schools (3) Staff

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| 249 | Teaching Art in Secondary Schools (3) | Staff |
| 250 | Teaching Mathematics in Secondary Schools (3) | Pyke |
| 251 | Second Language Instruction (3) | Chamot |
| | A variety of methods for teaching a second language, both in the context of English as a Second Language and for foreign language instruction. (Fall) | |
| 254 | Issues, Studies, and Practices in English as a Second Language (3) | Staff |
| | A critical review of scholarship and research findings in English as a second language. Major policy issues and implications that relate to ESL practice. (Summer) | |
| 255 | Educating Language Minorities (3) | Staff |
| | A study of federal, state, and local policies and issues affecting the education of linguistically diverse populations. Resources for use with specific linguistically diverse groups. (Spring) | |
| 256 | Linguistic Applications in English as a Second Language (3) | Staff |
| | A study of the science of language (phonology, morphology, syntax, semantics) and how its different branches (descriptive, social, applied, etc.) may be used for ESL teacher training, classroom instruction, material development, evaluation, research, and policy development. (Fall and summer) | |
| 257 | Second Language Acquisition (3) | Chamot |
| | Nature of first and second language acquisition and development; emphasis on sociolinguistics and psycholinguistics most pertinent to educational settings. (Fall and summer) | |
| 258 | The Immigrant Experience: Diversity, Advocacy, and Education (3) | Mazur |

- The course provides participants with a variety of integrative and supportive multicultural activities, demonstrations, discussions, and projects. Participants will gain a knowledge base of immigrant stories, issues of discrimination, issues of cultural variation, and factors that affect diverse groups of students. Same as SpEd 258. Material fee. (Summer)
- 272 **Strategies for Inclusion: Addressing Needs of Special Populations (3)** Mazur
- Same as SpEd 272.
- 275 **The Culturally and Linguistically Diverse Student with Special Needs: Policy, Research, and Trends (3)** Mazur
- Same as SpEd 275
- 276 **Academic and Psychosocial Assessment of the Culturally and Linguistically Diverse Student (3)** Mazur
- Same as SpEd 276.
- 287–88 **Clinical Study and Treatment of Reading Problems (3–3)** Comas
- A case study approach is employed to develop participants' competence to assess and tutor children, adolescents, and adults of diverse backgrounds, presenting a variety of reading and writing difficulties. Prerequisite: TrEd 222 and 224. Material fee. (Academic year)
- 289 **Organization and Administration of Reading Programs (3)** Staff
- For school administrators, reading teachers, reading specialists, and literary coaches. Issues in planning, organizing, and monitoring the total reading program. (Spring)
- 290 **Severe Learning Disabilities in Reading (3)** Staff

The course links the fields of learning disabilities and reading, focusing on their interconnections in terms of etiology, characteristics, diagnosis, and remediation.
(Fall)

291 **Reading and Writing Across the Curriculum (3)** Staff

A framework is presented for establishing a whole-language approach. Participants explore principles and strategies for developing students' reading and writing skills in art, literature, social studies, mathematics, and science. (Fall, spring, and summer)

292 **Internship: Reading (3 to 6)** Staff

Limited to graduate students in reading and literacy education. Experience in a selected area of teaching or supervisory service in field-based programs. Prerequisite: permission of instructor. (Fall and spring)

297–98 **Research and Independent Study (1 to 3)** Staff

Individual research under the guidance of a staff member; program and conferences arranged with an instructor.

308 **Instructional Processes in Teacher Preparation
and Special Education (3)** Kochhar

Same as SpEd 308.

309 **Supervising the Preservice Clinical Experience (3)** Tate, Beck

An investigation of the complex process of clinical supervision as it relates to the professional growth and development of the practitioners at the preservice level, with a focus on both the interpersonal/social dimension and the process of instructional supervision. (Fall)

325 **Curriculum Theory (3)** Green, Paley

- Examination of reviews and research studies on curriculum theory. Focus on trends, values, interpretations, design systems, and evaluation. Prerequisite: TrEd 205.
- 330 **Paradigms of Instruction and Assessment (3)** Green, Milman
- A foundation of theory, models, and variables that have contributed to the fields of instruction and assessment. The major paradigms of instruction and assessment. Material fee. (Spring)
- 331 **Seminar in Instruction (3)** Pyke, Lynch
- Analysis of alternative models of instruction and the factors that influence the instructional process in schools. Connections among learning, instructional theory, research, and practice. Material fee. (Fall)
- 332 **Search of the Literature in Curriculum and Instruction (3)** Chamot, Lynch, Pyke
- Analysis of types of literature reviews in the field of curriculum and instruction and development of a literature review; the relationship of theory building to review of literature, and how research questions arise from extant theory and related literature. For doctoral students in curriculum and instruction, to precede TrEd 390. Material fee. (Spring)
- 333 **School Reform through Professional Development (3)** Kortecamp
- Fundamental perspectives of school reform through professional development of educators (K–12); evolution of contemporary professional development models and trends: examination of interactive modules using selected professional development activities. Material fee. (Spring)
- 334 **Seminar in Research in Curriculum and Instruction (1 to 3)** Staff

Models of curriculum and instruction research that span various research methods.

345 **Consultation Skills in Teacher Preparation and Special Education (3)** West

Same as SpEd 345.

353 **Post-Master's Internship in Teacher Education (3 to 6)** Staff

Same as SpEd 353.

354 **Doctoral Internship: Teacher Education (3 to 6)** Staff

Same as SpEd 354.

370 **Attitude Change and the Access Process (3)** Castleberry

Same as SpEd 370.

378 **Post-Master's Internship in Curriculum and Instruction (3 to 6)** Staff

Supervised fieldwork for selected experienced teachers. (Fall and spring)

390 **Doctoral Seminar in Curriculum and Instruction (3 to 6)** Shotel

Review of literature in a topical area; preparation of a dissertation proposal and a manuscript of publishable quality. Admission by permission of instructor and approval of major advisor. Material fee. (Fall)

391 **Dissertation Research (3 or 6)** Staff

Prerequisite: TrEd 390.

SPECIAL EDUCATION

201 **Overview of Special Education (3)** Shotel and Staff

Survey course to acquaint prospective teachers with special education and to help them become aware of the various educational modifications necessary to accommodate children with special needs in a school program.
(Fall, spring, and summer)

- 220 **Selected Topics** (arr.) Staff
Topics and fees announced in the Schedule of Classes.
- 221 **Accessing Community Systems for
Individuals with Disabilities** (3) Freund
Overview of access to community systems and service delivery for individuals with special needs and their families. Material fee. (Summer)
- 222 **Legal Issues and Public Policy for
Individuals With Disabilities** (3) Kochhar, Leconte, Shotel
Examination, interpretation, and analysis of legislation and policies affecting the education and career development of individuals with disabilities. Emphasis on federal legislation in the context of national policy reform in disability services. Material fee. (Fall)
- 223 **Introduction to Brain Injury:
Programs, Policies, and Resources** (3) Ruoff and Staff
An overview of acquired brain injury and its effects; current trends in the field, related policy, research, and development of new resources. (Fall)
- 224 **Brain Function and Impact of
Brain Injury on Learning and Education** (3) Ruoff and Staff
Provides an in-depth understanding of neuroanatomy related to the impact of brain injury on child and adolescent development and learning to prepare educators to participate in educational assessment and planning. (Spring)
- 225 **Family Partnership for Systems Change** (3) Ruoff, Kochhar

- Applies a family systems perspective to prepare educators to establish and maintain partnerships with families of individuals with disabilities to improve educational services and access. Family roles in individualized education planning and service system coordination are addressed. (Spring and summer)
- 226 **Career–Technical Education for Special Populations (3)** West
Preparation for leadership roles as career and technical education and transition personnel; overview of delivery models emphasizing special education. (Spring)
- 227 **Technology in Vocational Evaluation (3)** Leconte and Staff
Introduction to an array of assistive technology services and products facilitating professional interventions and vocational evaluation procedures; application to the assessment of persons with disabilities. Material fee. (Fall)
- 228 **Community-Based Assessment and Work Sample Development (3)** Leconte and Staff
Introduction to community-based vocational appraisal methods; development of job training analysis skills, labor market surveys, work samples; requirements of The Americans with Disabilities Act; incorporation of assistive technology; classroom theory and field work. Material fee.
- 229 **Interpretation and Application of Academic and Vocational Assessment Information (3)** Leconte
Specific strategies and techniques to analyze, interpret, and synthesize assessment information for the development of comprehensive academic/vocational profiles for adolescents and adults with disabilities. Observation and recording procedures, report development, and postassessment conferencing are emphasized. Material fee.

(Summer)

230 **Vocational Assessment of Individuals with Disabilities** (3 to 6) Leconte

Investigation of vocational appraisal processes and techniques for individuals with disabilities. Includes assessment for transition using field-based assignments. Three credits of practicum experience for students specializing in vocational evaluation.

Material fee. (Fall, spring, and summer)

231 **Instructional Methods in Special Education and Transition** (3) Taymans, West

Techniques and processes used in programming for the needs of individuals with disabilities as they prepare for transition to postsecondary programs and employment. Emphasis on skills related to professional liaison and support roles in the design of instructional arrangements and cooperative training. Material fee. (Fall and spring)

232 **Foundations in Special Education, Career Development, and Transition** (3) Kochhar

Overview of historical, theoretical, and philosophical foundations of career development and transition. Explores directions for career development/transition practices in the context of educational reform and social and political change.

Material fee. (Fall)

233 **Curriculum in Transition Special Education** (3) Taymans, West

Theory and practice in planning, implementing, and evaluating curriculum for individuals with disabilities. Emphasis on techniques for modifying curriculum and materials for individualized programming. Requires field-site curriculum implementation. Material fee. (Fall and spring)

- 234 **Seminar in Professional Development** Kochhar
 in Special Education and Transition (3 to 6)
 Analysis and development of advanced professional writing skills, including literature synthesis, persuasive writing, and proposal writing. Material fee. (Fall)
- 235 **Employment Models for Individuals with Disabilities (3)** Staff
 Rationale, occupational resources, and programming strategies for job placement and the development and coordination of employment programs for individuals with disabilities. Material fee.
- 236 **Introduction to Career and Career–Technical Education** West and Staff
 and Transition Services (3 to 6)
 Introduction to programs that provide career and technical education and transition services to individuals with disabilities. Material fee. (Summer)
- 237 **Learning Strategies, Assessment, and Instruction** Taymans
 for Individuals with Learning Disabilities (3 to 6)
 Theory and practice in evidence-based reading interventions. Learning strategies; content enhancement focused on literacy and self-determination. Material fee.
 (Spring and summer)
- 238 **Issues in Educating Individuals with Learning Disabilities (3)** Taymans
 Introduction to the academic, cognitive, social, and emotional characteristics of individuals with learning disabilities; etiological theories; educational service delivery models, with particular emphasis on the adolescent with learning disabilities. Policy issues, continuum of services, and the transition from school to post-school environments. Material fee. (Fall and spring)

- 239 **Collaboration for Professionals Working with Students with Special Needs (3)** Taymans and Staff

Exploration of attitudes and beliefs about team teaching, collaboration and inclusionary environments. Development of knowledge and skills related to collaborative consultation and team teaching; interpersonal communication; the dynamics of collaborative teams; examination of the variety of environments in which special educators work. Material fee. (Fall and spring)

- 240 **Family Support and Guidance in Special Education (3)** Jarrett

The developmental process of parenting and how that process is affected by having a child with developmental delay or disability. Family systems theory, stress and coping mechanisms, and communication and support strategies. Material fee. (Fall and summer)

- 241 **Dynamics of Family Intervention: Theory and Practice in Special Education (3)** Rice

Theoretical foundations and clinical techniques necessary for the special educator to collaborate with parents of adolescents with emotional and behavioral disabilities. Material fee. (Fall and spring)

- 242 **Neurodevelopmental Assessment and Programming for Infants and Toddlers with Disabilities (3)** Jarrett

Application of the neurodevelopmental model to techniques for developing and implementing educational programs for infants and toddlers with disabilities.

Prerequisite or concurrent registration: SpEd 263 or 268 or permission of instructor. Material fee. (Fall)

- 243 **Developmental Assessment of Infants (3)** Jarrett
- Theory and current practice in the assessment of infants with or at risk for developmental disabilities. Material fee. (Spring)
- 244 **Ethical Considerations in Neonatal and Infant Intervention (3)** Freund
- Overview of the major ethical issues involved in neonatal and infant intervention. The impact of recent and emerging technological innovations considered from medical, legal, ethical, and psychosocial perspectives. Material fee. (Spring and summer)
- 253 **Special Education in Correctional and Alternative Settings (3)** Staff
- An introduction to the delivery of special education services within a range of alternative settings and the juvenile justice and corrections systems. Material fee. (Spring)
- 254 **Special Education in Correctional and Alternative Settings: Field Experiences (3)** Staff
- Site visits to local, state, and federal juvenile correction facilities and advocacy organizations, with seminar series to integrate theory and practice. Material fee. (Summer)
- 255 **Interdisciplinary and Interagency Services Coordination for Special Populations (3)** Mazur, Kochhar, and Staff
- Overview of models and strategies for coordinating services across disciplines and among school and community agencies for special populations. Emphasis on interdisciplinary team coordination, communication, decision making, planning, and follow-up for individuals with disabilities. Material fee. (Fall, spring, and summer)
- 258 **The Immigrant Experience: Diversity, Advocacy, and Education (3)** Mazur

Same as TrEd 258.

260 **Developmental Assessment in Special Education (3)** Castleberry

Examination of formal psychoeducational tests used with preschool and elementary-school-aged children. Development of formal and informal assessment techniques. Introduction to the skills necessary to write psychoeducational reports. Material fee. (Fall, spring, and summer)

261 **Practicum: Methods and Materials for Young Children with Disabilities (3 or 6)** Jarrett, Castleberry, Shotel

Clinical practice in design and implementation of educational strategies and materials, including designing and developing teaching materials, classroom teaching, feedback and evaluation with professor. A seminar accompanies this clinical experience. (Fall, spring, and summer)

262 **Formal Assessment of Young Children with Disabilities (3)** Castleberry

Weekly seminar designed to prepare early childhood special educators to translate formal assessment data into instructional programming. Requires fieldwork with children. Material fee. Prerequisite: SpEd 260 or equivalent. (Summer)

263 **Development of the Infant with Special Needs (3)** Jarrett

The processes of normal infant development and interrelationships among areas of development; relationship of these processes to the growth and development of infants with or at risk for developmental disabilities. Material fee. (Fall)

266 **The Development of Language and Literacy (3)** Jarrett, Mazur

Typical and atypical language acquisition and literacy development. Assessment and intervention strategies for parents and professionals. Material fee.

(Fall, spring, and summer)

- 267 **Instructional and Assistive Technology** Jarrett
in Early Childhood Special Education (3)

Instructional strategies and assistive technology and their implications and uses for young children (0–5 yrs) in a wide variety of environments. Lectures, laboratory, and demonstrations. Material fee. (Fall)

- 268 **Development of Young Children with Disabilities (3)** Castleberry, Mazur

Theories of human growth and development are considered as a framework for examination of typical and atypical development of young children. Material fee.

(Fall, spring, and summer)

- 269 **Etiology, Symptomatology, and Approaches** Castleberry, Mazur
to Intervention with Children with Disabilities (3)

An in-depth examination of the causes and characteristics of various disabilities.

Current principles and approaches to intervention are examined. Material fee.

(Spring)

- 270 **Adapting Attitudes, Programs, and Curriculum** Staff
for Students with Disabilities in the Mainstream Environment (3)

Meeting the needs of the special-needs student in the regular classroom. Material fee.

(Spring and summer)

- 271 **Interdisciplinary Approach to Planning** Rice
for Children with Disabilities (3)

Interdisciplinary team functioning and service coordination using a systems approach. Organizational development theories, attributes of effective teams, communication, negotiation strategies, and service coordination.

272 **Strategies for Inclusion: Addressing Needs of Special Populations (3)** Mazur

Strategies by which second language learners, students with disabilities, and students with disabilities who are also second language learners can be in an inclusionary setting so that all teachers can more effectively assume the responsibility to serve all children in our schools. Material fee. (Fall, spring, and summer)

273 **Impact of Culture on Education (3)** Mazur

The impact of culture and ethnicity on educational experiences. The relationship between school culture in the United States, one's own culture(s), and the cultures of diverse populations existing within our schools. Values, norms, rules, ethics, beliefs, attitudes, expectations, and assumptions of various cultures. Material fee. (Fall, spring, and summer)

275 **The Culturally and Linguistically Diverse Student with Disabilities: Policy, Research, and Trends (3)** Mazur

Educational service delivery for the culturally and linguistically diverse student. National, state, and local policies; current research in bilingual education, special education, and bilingual special education. Assessment techniques, accessing resources, and characteristics and needs of language-minority students and their families. Same as TrEd 275. Material fee.

276 **Academic and Psychosocial Assessment of the** Mazur

Culturally and Linguistically Diverse Student (3)

Issues and implications of second-language learning; the relationship between learning disabilities and problems related to adaptation to a different culture. Students review and evaluate formal and nonformal assessment measures and administer bilingual assessment materials. Same as TrEd 276. Material fee.

277 Teaching the Culturally and Linguistically Diverse Student with Disabilities: Methods, Materials, and Classroom Management (3) Mazur

Commonly used tests, formal and informal assessment strategies and prereferral interventions, and curricular and classroom management strategies for use with bilingual students who have special needs. Instructional adaptations designed to meet cultural, linguistic, and academic needs in both mainstream and special classes. Material fee.

278 Internship: Educational Intervention for the Culturally and Linguistically Diverse Student with Disabilities (3 to 6) Mazur

Supervised internship. Students learn to write culturally relevant IEP programs, conduct effective parent interviews, and relate assessment findings to productive programming. Material fee.

279 Dynamics of Interaction: The Essence of Relationships Between Teachers and Students (3) Rice

An examination of philosophical and psychological theory germane to understanding the nature of human interaction between teachers and students. Material fee. (Fall)

280 Developmental Assessment of Adolescents (3) Staff

Formal and informal psychoeducational assessment; assessment instruments commonly used with upper-elementary, junior, and senior high school students; the writing of psychoeducational reports. Material fee. (Spring)

281 **Internship in Teaching Children with Emotional and Behavioral Disabilities: Assistant Teacher (3 to 6)** Rice

A full-time teaching experience with children with emotional and behavioral disabilities. Graduate students assist in implementing psychoeducational assessment and teaching practices. Daily guidance by on-site training teachers and weekly supervision by University clinical faculty. Weekly seminar accompanies this internship. Material fee. (Fall)

282 **Internship in Teaching Children with Emotional and Behavioral Disabilities: Co-Teacher (3 to 6)** Rice

Continuation of SpEd 281. Graduate students become the primary teaching team in the classroom with ongoing supervision. Graduate students plan and apply psychoeducational teaching strategies with children with emotional and behavioral disabilities. Refinement of instructional and behavior management strategies. Weekly seminar continues. Material fee. (Spring)

283 **The Urban Setting and Its Impact upon Children with Emotional and Behavioral Disabilities (3)** Staff

The cultural differences and ethnic complexities that face minority children in urban schools. Effects of the total environment in which inner-city children live on their ability to learn, feel, and behave. Material fee. (Fall)

284 **Preparation for Internship in Teaching Adolescents** Staff

- with Emotional and Behavioral Disabilities (3)**
- Review and refine program theory and skills of the psychoeducational theory prior to internship. Material fee. (Spring)
- 288 **Characteristics of Emotional and Behavioral Disabilities (3)** Rice
- An in-depth examination of typical and atypical growth and development, psychiatric diagnosis and psychosocial development issues, and general and specific characteristics of the student with serious emotional disabilities. May be repeated for credit. Material fee. (Fall and spring)
- 290 **Affective Development and Behavior Management in Special Education (3)** Castleberry, Jarrett, Ihrig
- Theory, programming, and behavior management strategies from theoretical and practical points of view. Material fee. (Spring)
- 291 **Behavior Management Practicum: Adolescents with Emotional and Behavioral Disabilities (3)** Rice
- Field-based examination of theory of behavior development and techniques for classroom management. Material fee. (Summer)
- 292 **Internship: Teaching Young Children with Disabilities (3 or 6)** Castleberry
- Supervised internship in early childhood special education. Weekly seminar. Material fee. (Spring and summer)
- 293 **Internship: Early Intervention (3 to 6)** Jarrett
- Supervised internship in early intervention. Weekly seminar. Material fee. (Fall, spring, and summer)

- 294 **Internship: Teaching Adolescents with Emotional and Behavioral Disabilities (3 to 6)** Rice
- Full-time placement as a psychoeducator in various roles and sites. Material fee.
- (Fall, spring, and summer)
- 295 **School- and Community-Based Internship in Special Education and Transition (1 to 9)** Leconte, Taymans
- A 50- to 450-hour supervised internship in school- and community-based settings involved in career, vocational, and transition services. (Fall, spring, and summer)
- 296 **Teaching Internship in Transition Special Education (3 to 6)** Kochhar, West, Taymans
- Supervised teaching internship; seminar required. Permission by instructor. Material fee. (Fall, spring, and summer)
- 297–98 **Research and Independent Study (1 to 3)** Shotel
- Individual study or research under guidance of staff member. Admission by permission of advisor. May be repeated for credit.
- 301 **Research Seminar in Special Education (arr.)** Kochhar
- Participation in a small group with a selected faculty member; research on and discussion of an area of common interest. Admission by permission of instructor.
- (Summer)
- 303 **Administration and Supervision of Special Education (3)** West and Staff
- Philosophy and nature of special education; program organization, administration, and development. Surveying local needs; program evaluation and supervision.
- Admission by permission of instructor. Material fee. (Spring)

- 304 **Recent Research and Trends in Special Education (3)** Taymans, Kochhar
Emphasis on topical research issues, problems of conducting research, and procedures and sources for obtaining research funding. Material fee. (Fall and spring)
- 308 **Leadership and the Professoriate in Special Education (3)** Kochhar
Philosophical and methodological aspects of personnel preparation in university and field-based programs; opportunities for practice in needs assessment, program design, and instruction. Admission by permission of instructor. Same as TrEd 308. Material fee. (Spring)
- 309 **Supervising the Preservice Clinical Experience (1 to 3)** Tate, Beck
An investigation of the complex process of clinical supervision as it relates to the professional growth and development of practitioners at the preservice level. Focus on interpersonal/social dimensions and the process of instructional supervision. (Fall)
- 334 **Seminar in Research in Curriculum and Instruction (1 to 3)** Staff
Models of curriculum and instruction research that span different research methods.
- 343 **Psychoeducational Diagnosis in Special Education (3)** Staff
The range of diagnostic and intervention strategies applicable to the student who presents psychosocial and related learning difficulties. Admission by permission of instructor. Material fee. (Spring)
- 345 **Consultation Skills in Teacher Preparation and Special Education (3)** West

- Consultation models from organizational development, organizational psychology, and mental health applied to professional practice in education and special education. Material fee. (Spring)
- 352 **Disability in Contemporary Society (3)** Kochhar
Overview of current legislation and public policy affecting education, employment, and civil rights of individuals with disabilities. The evolution of disability policies and their relationship to principles of social justice. Material fee. (Fall)
- 353 **Post-Master's Internship** Jarrett, Freund, Mazur, Kochhar,
in Special Education (3 to 6) Shotel, Taymans, West
Supervised professional internship in college teaching, administration, supervision, research, or policymaking. Internships are individually arranged. Admission by permission of instructor. (Fall, spring, and summer)
- 354 **Doctoral Internship:** Jarrett, Freund, Kochhar, Mazur,
Special Education (3 to 6) Shotel, Taymans, West
Supervised professional internship in college teaching, administration, supervision, research, policymaking, or private agency function. Each internship is individually arranged. Admission by permission of advisor. (Fall, spring, and summer)
- 360 **Interdisciplinary Techniques in the Diagnostic** Staff
Process in Special Education (3)
Application of theoretical concepts of assessment; development of assessment programs; interpretation and application of interdisciplinary diagnostic evaluations. Prerequisite: SpEd 260 or equivalent, and permission of instructor. Material fee. (Fall)

370 Attitude Change and the Access Process (3)

Castleberry

Consideration of psychosocial constructs germane to the role of the consultant/administrator in educational and interdisciplinary settings. Application of theory in accessing human service delivery systems. Material fee. (Fall)

390 Doctoral Seminar in Special Education (3 to 6)

Shotel

Review of literature in a topical area; preparation of a dissertation proposal and a manuscript of publishable quality. Admission by permission of instructor and approval of major advisor. Material fee. (Fall)

391 Dissertation Research (3 or 6)

Prerequisite: SpEd 390.

THEATRE AND DANCE

Professors A.G. Wade (*Chair*), L.B. Jacobson

Associate Professors W.A. Pucilowsky, C.F. Gudenius, E.J. O'Brien

Assistant Professor V.S. Smith, C.F. Gomez

Master of Fine Arts in the field of classical acting—Columbian College of Arts and Sciences, in cooperation with the Shakespeare Theatre Academy for Classical Acting, offers the Master of Fine Arts in the field of classical acting. The program is an intensive endeavor intended for students who have had extensive theatre training as part of their undergraduate preparation or have spent several years after completing college as working professionals in the field.

Required: The general requirements stated under Columbian College of Arts and Sciences. The 59-credit-hour degree program is taken in three intensive sessions over an 11-month period.

Master of Fine Arts in the field of theatre with a concentration in theatre design—

Prerequisite: the degree of Bachelor of Arts from this University, or an equivalent degree.

Required: the general requirements stated under Columbian College of Arts and Sciences. The program of study consists of 54 credit hours of 100- and 200-level course work in theatre and dance and in art, planned in consultation with the advisor, including a creative thesis (TrDa 299–300). The program may emphasize scenery, lighting, or costume. For listings of 100-level courses, see the Undergraduate Programs Bulletin.

Departmental prerequisite: Prerequisite to TrDa 201 through 229: degree candidacy in the M.F.A. in the field of classical acting. Prerequisite to all other 200-level courses: M.F.A. candidacy and permission of instructor.

201–4 **Acting** (2 or 3 each)

The focus of the acting sequence shifts with each session, providing a studio structure to explore and meet the demands of the classical canon. Portions of the sequence focus on the history plays and tragedies, classic comedy, high comedy, the Jacobean, and master classes.

205–8 **Topics in Classical Drama and Culture** (1 or 2 each)

Plays and other writings from the Elizabethan, Jacobean, and Restoration eras and the 18th century. The historical world in which the plays were written as well as the imaginary worlds created in the plays themselves.

209–10 **Text** (2–2)

Textual analysis emphasizing development of aesthetic expression. The forms and rules of verse: its meter, scansion, and overall structure in the early, middle, and late Shakespeare plays, as well as the intricacies of the prose.

211–14 **Voice and Speech** (2 or 3 each)

The development of clear, supported speech and sound that can meet the demands and challenges of classical texts. Resonators, articulators, breathing, and placement; phonetics and ear training; defining the character through the voice.

215–18 **Movement** (1 or 2 each)

The development of an awareness of the body and its expressive abilities through an integrated approach that includes ballet, modern dance, Hatha Yoga, and Feldenkrais for coordination, focus, and expression.

219–22 **Alexander Technique** (1 or 2 each)

Through group work and individual sessions, students develop a further awareness of the body toward expression of imagination and the creative process, enabling powerful characterization without stress or personal physical distortion.

223–24 **Stage Combat** (2–2)

Skills in stage combat techniques, including unarmed combat and broadsword, buckler, rapier, dagger, and other lighter weapons, toward development of greater physical strength and an awareness of safety issues. The course is designed to lead to certification as an actor/combatant through the Society of American Fight Directors.

225–28 **Practicum** (arr.)

This sequence of courses includes scene preparation, rehearsal/production, clown class, and other performance skills.

229 **Audition Techniques** (3)

A set of workshops to help students develop strong audition skills. Business aspects of acting, such as selection of agents, Equity status, and taxation issues. The

workshop concludes with a showcase performance for casting directors, agents, and theatre directors.

231 **Lighting Design (3)** Gudenius

Theory and execution of lighting design for theatre and dance. Prerequisite: TrDa 131. May be repeated for credit.

233 **Architecture of Theatre and Exhibit Spaces (3)** Staff

Theatrical architecture from a historical perspective. Traditional and nontraditional exhibit, theatrical, and assembly spaces are examined and evaluated with reference to the functional use of space from practical, architectural, and aesthetic perspectives. Studio work includes design of a hypothetical performance space and its auxiliary units.

235 **Scene Design (3)** Staff

Exploration of all styles of traditional and contemporary scenic design. May be repeated once for credit. Admission by permission of instructor.

236 **Intermediate Costume (3)** Pucilowsky, Smith

Introduction to the basic techniques of costume design through specific projects. Various rendering techniques will be explored, consistent with the historical period concerned. May be repeated for credit. Prerequisite: TrDa 136.

237 **Advanced Costume (3)** Pucilowsky, Smith

Study of special design, style, and construction problems. May be repeated for credit.

238 **Pattern Making (3)** Pucilowsky, Smith

The study of pattern drafting and draping methods, based on contemporary and historical clothing, through lecture and class work. Prerequisite: TrDa 136.

241 **Production Drafting** (3) Gudenius

Development of drafting skills for production: groundplans and shop documents. Use of traditional hand drafting and computer assisted design.

246 **Scene Painting** (3) Gudenius, Smith

Development of the skills of painting needed for the reproductive craft of theatrical painting. Material fee.

291 **Internship** (3 or 6) Staff

Internships with theatre companies or arts organizations, including conference and/or seminar. May be taken for a total of 6 credit hours.

292 **Selected Topics** (1 to 3) Staff

May be repeated for credit.

294 **Independent Research** (arr.) Staff

May be repeated for credit.

299–300 **Thesis Research** (3–3) Staff

TOURISM AND HOSPITALITY MANAGEMENT

Professors D.E. Hawkins, D. Frechtling, L. Yu (*Chair*)

Associate Professors L.A. Delpy Neirotti, S. Elliott

Assistant Professors R. Brouard, S. Boo, S. Levy

Professorial Lecturers W.C. Corkern, E. Zavian

Lecturers L.K. Long, I. Christie

See the School of Business for programs of study leading to the Master of Tourism Administration and Master of Business Administration. For information on the five-year, joint-degree program leading to the Bachelor of Business Administration and Master of Tourism Administration, see the Undergraduate Programs Bulletin.

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| 214 | Consultative Processes (3) | Hawkins |
| | Same as Mgt/SMPP 214. | |
| 220 | International Hotel Management (3) | Yu |
| | The study of multinational hospitality operations, with emphasis on U.S. corporate involvement in and planning for overseas expansions. Political, economic, cultural, financial, and legal aspects inherent in the international business environment. (Fall) | |
| 221 | Hotel/Resort Market Analysis (3) | Yu |
| | Analysis of market demand for accommodation in a tourism destination; valuation methods for determining market value of a hotel/resort project; project management for hotel/resort development. (Spring) | |
| 230 | Organization and Management of Airlines (3) | Staff |
| | Overview of domestic and international passenger air transportation systems.
Analysis of planning, financing, operating, marketing, and evaluating airline transportation systems. Legal and regulatory aspects of airline operations.
Development of infrastructure and related support services. | |
| 249 | Economic, Cultural, and Environmental Aspects of Tourism (2) | Elliott |
| | Relationship of tourism and sustainable development; specific emphasis on cultural, environmental, and economic impacts and trends. (Fall) | |

- 250 **Administration of Tourism and Hospitality Services (2)** Hawkins
Organization and management concepts, theory, and issues, stressing application of theory through analysis of case examples drawn from the tourism and hospitality industry. Prerequisite TStd 104 or equivalent. (Fall)
- 251 **Statistical Applications in Tourism/Hospitality Management (2)** Yu
Application of quantitative methods in tourism and hospitality management research. Procedures and methodology for collecting data, summarizing and interpreting data, and drawing conclusions based on the data. (Fall)
- 260 **Tourism Development (3)** Staff
Tourism development approaches, contexts, and consequences for local/regional destinations; application of financial management concepts to the feasibility study of a proposed tourism-related facility; and evaluation of the sustainability of a tourism development strategy. (Fall)
- 261 **Tourism Planning (3)** Staff
Integrated planning for tourism organizations; development of comprehensive tourism projects; consideration of basic concepts, approaches, and models. (Spring)
- 262 **Tourism Policy Analysis (3)** Staff
Components of tourism policy, including development of tools for tourism policy analysis and description of tourism organizations in the government and private sector. (Spring)
- 263 **Tourism Marketing (3)** Frechtling
Concepts and techniques employed in marketing tourism industry services and development of the annual marketing plan. (Fall)

- 264 **Sport Marketing (3)** Delpy Neirotti
- Application of marketing theories to sport and events. Case examples of marketing athletes, teams, facilities, sport products and organizations, as well as using sport or events as a marketing tool for products. Writing sponsorship and endorsement proposals and incorporating sport into an integrated marketing plan. Prerequisite: MBAd 230 or equivalent. (Fall)
- 265 **Sport Law: Contracts and Negotiations (3)** Zavian
- Examination of legislation and specific case law as related to professional and amateur athletes, sport events, licensed merchandise, broadcast and sponsorship rights. Topics include labor and anti-trust law; contract negotiation, specifications, and interpretation. (Spring)
- 266 **Sport and Event Facility Management (3)** Delpy Neirotti
- Financing, market analysis, design, operations, and marketing of sport and event facilities from stadiums and arenas to amphitheaters and convention centers. (Spring)
- 267 **Sport Media and Communications (3)** Staff
- Concepts and practices of sport public relations, media relations and management, the Internet, and other media utilized in sports. Press releases, publications, crisis management, and press operations. (Summer)
- 270 **Tourism Research (2)** Frechtling
- Survey research and other research methods and their applications to tourism, hospitality, sport, event, or related management. (Spring)
- 276 **Risk Management for Events and Meetings (3)** Boo

- Risk and liability issues that may arise in the planning and management of events, meetings, conventions, and exhibitions. Preventative and responsive measures designed to minimize adverse impacts on event stakeholders. (Fall)
- 277 **Event Management (3)** Boo
- An introduction to the theoretical and practical foundations of event management. Fundamentals of planning, budgeting, and evaluating events. Prerequisite: M.T.A. candidacy or permission of instructor. (Fall)
- 278 **Conference and Exposition Management (3)** Boo
- Site selection, program planning and management, exhibits, selection and use of facility, volunteers, and budget management. (Spring)
- 279 **Event Entertainment Management (3)** Staff
- Event entertainment, including designing and planning the entertainment component of an event, as well as managing and marketing entertainers in an event context. (Spring)
- 280 **Advanced Workshop (1 to 6)** Staff
- Workshops with emphasis on contemporary issues and opportunities; development of advanced professional competencies. May be repeated for credit with permission of advisor. (Fall and spring)
- 282 **International Experience (1 to 6)** Staff
- Travel to a foreign country for study of specific topics. May be repeated for credit with approval of advisor. (Fall, spring, and summer)
- 283 **Practicum (3)** Staff

For graduate students enrolled in a degree program or field offered through the department. Fieldwork, internship, and/or instructional practice, including conference and/or seminar. May be repeated once for credit with permission of advisor.

(Fall, spring, and summer)

290 **Special Topics** (1 to 3) Staff

Experimental offering; new course topics and teaching methods. May be repeated once for credit.

296 **Travel Information Management Systems** (3) Elliott

Database utilization, information analysis, reservation systems, computer applications including the Internet, and related travel management systems.

(Fall, spring, and summer)

297 **Advanced Topical Studies** (3) Frechtling

Required capstone experience for tourism administration students who do not select the thesis option. Analysis of case situations involving policy formulation or management decision making; emphasis on applied strategic planning and management approaches. (Fall, spring, and summer)

298 **Directed Reading and Research** (1 to 3) Staff

Supervised readings or research. Admission by prior permission of instructor. May be repeated for credit.

299 **Thesis Seminar** (3) Staff

300 **Thesis Research** (3) Staff

UNIVERSITY PROFESSORS

University Professors A. Etzioni, P.J. Caws, S.H. Nasr, J.N. Rosenau, S.A. Saltzburg, H. Harding, B. Wood, S.J. Trachtenberg, V.N. Gamble

Courses numbered in the 770s and 780s are taught by distinguished scholars who hold appointments as University Professors. With the approval of the department or program concerned, appropriate University Professor courses may be taken to satisfy degree program requirements. Permission of the University Professor may be required for enrollment. A complete listing of courses offered each semester appears in the Schedule of Classes under the 700 series. Following is a list of courses that are expected to be taught fairly regularly by University Professors.

Anth

770 **Our Place in Nature** (3) Wood

How our understanding of human evolution and of the relationship between modern humans and the natural world has evolved. The fossil record for human evolution, the social and intellectual context of the discoveries, and biographies of those who made major contributions to the recovery and interpretation of the fossil evidence. For undergraduates; open to graduate students.

Hist

771 **Epidemics in American History** (3) Gamble

Epidemics in the United States from the colonial period to the present, including the development of the medical and public health responses to epidemics and their social, political, and economic impacts on American history and culture. For graduate students; open to upper-level undergraduates.

Hist

772 **American Medicine and Public Health:** Gamble
African American Experiences (3)

The experiences of African Americans as patients and as health care providers are used to examine the history of relationships among race, medicine, and public health. The historical roots of contemporary policy dilemmas such as racial and ethnic disparities in health and health care. For graduate students; open to undergraduates.

IAff/PSc

770 **Turbulence in World Politics (3)** Rosenau

An effort to probe the sources and dynamics of change and continuity in local, national, and international affairs. The links between the orientations of individuals and the actions of collectivities are a major focus, along with the foundations of authority under transformative conditions. For graduate students; open to upper-level undergraduates.

IAff/PSc

772 **The Dynamics of Globalization (3)** Rosenau

An inquiry into the economic, cultural, and political processes through which individual and community life is expanding as awareness encompasses factors on a global scale. The consequences of this expansion at both global and local levels is examined, along with the possibility that these levels interact. For graduate students; open to upper-level undergraduates.

Phil

772 **Individualism (3)** Caws

The concept of the free individual in philosophy, psychology, literature, and politics: individuals and groups; individualism and collectivism; exemplary individuals in biography, autobiography, and fiction; problems of individual and collective agency and identity. For undergraduates; open to graduate students.

Phil

774 **Understanding Technology (3)** Caws

The idea of technology—its relation to the sciences and the arts and humanities, its development, and its problems. Technology will not be regarded as merely dependent on the sciences or as merely useful (or dangerous) but as a human activity in its own right, with its own history, conceptual structure, interests, risks, and benefits. For undergraduates; open to graduate students.

Phil

778 **Left and Right in Philosophy and Politics (3)** Caws

A fundamental inquiry into the concept of the state in terms of entrenched oppositions: individualism/collectivism, equality/liberty, liberalism/conservatism, socialism/free enterprise, communism/capitalism. Emphasis on the present need to find a constructive transcendence of these oppositions. For graduate students; open to undergraduates.

Phil

779 **Philosophy and Psychoanalysis (3)** Caws

An exploration of some striking parallels between the topics addressed by Freud's psychoanalytic theories on the one hand and the traditional content of philosophical reflection on the other, with special emphasis on the relation between cognitive

theory and therapeutic practice (in both disciplines). For graduate students; open to undergraduates.

Rel

770 **Islamic Civilization and the West (3)** Nasr

The encounter of Islam and the West, from the rise of Islam to modern times.

Investigation of the impact of Islam on European philosophy, science, art, and literature; influence of the West and Western scholarship on the Islamic world. For juniors and seniors; open to graduate students.

Rel

771 **Persian Sufi Literature in East and West (3)** Nasr

The writings of major Persian Sufi poets and writers, such as Khayyam, Attar, Rumi, Shabistari, and Hafiz, and their impact on the West and on India. The translation of these works into European languages and their influence upon such figures as Goethe and Emerson are discussed. Assigned readings in English. For undergraduates; open to graduate students.

Rel

772 **Mysticism—East and West (3)** Nasr

A thematic examination of mystical traditions: the nature of mysticism, the search for ultimate reality, the mystical significance of the cosmos, the mystical science of the soul, and the significance of sacred art and symbols. Major mystical traditions of East and West—Hinduism, Taoism, Buddhism, Judaism, Christianity, Islam. For undergraduates; open to graduate students.

Rel

773 Perennial Philosophy (3)

Nasr

The idea of perennial philosophy as developed in the 20th century by A. Huxley, A.C. Coomaraswamy, and others. Doctrines and teachings of perennial philosophy as found in various religious and philosophical traditions of East and West. Prerequisite: at least one course in religion, philosophy, or intellectual history. For undergraduates; open to graduate students.

Rel

775 Man and the Natural Environment (3)

Nasr

The religious, philosophical, and scientific causes of the present environmental crisis. The history of religious and philosophical attitudes toward nature in the West, in the history of Western science, and in some non-Western world views that may encourage a more harmonious relationship between man and the natural environment. For undergraduates; open to graduate students.

Rel

777 Religion and Science (3)

Nasr

The interaction between religion and science in ancient Egypt, classical Greece, Islam, India, China, and the West, from the Renaissance, the scientific revolution, and up to the present day. Key concepts and issues in the encounter of religion and science in light of the cultural matrix of the civilization and period in question. For juniors and seniors; open to graduate students.

PPol/PAd/Educ

771 The University Presidency (3)

Trachtenberg

The changing nature of the presidency of American colleges and universities. Limits of the president's power and responsibility; governance roles in state-supported and independent institutions; the board of trustees; the university general counsel; accrediting bodies; the media. For graduate students; open to undergraduates with permission.

Soc

785 **The U.S. System of Criminal Justice (3)**

Saltzburg

The powers of law enforcement and how they relate to rights conferred upon suspects and defendants by the Constitution. A rule-oriented view of police authority to stop, search, and arrest; the privilege against self-incrimination; responsibilities of prosecutors and defense counsel; roles of judge and jury; and the right of the public and press to be present during judicial proceedings. For undergraduates.

WOMEN'S STUDIES

Professors H. Hartmann (*Research*), P.M. Palmer, B. Gault (*Research*)

Associate Professors C.E. Harrison, C. Deitch, D. Moshenberg (*Director*), A. Zucker

Assistant Professor K. Pemberton

Adjunct Professors B. Morris, A. Lynch

Professorial Lecturer M. Frost

Committee on Women's Studies

N. Cahn, E. Chacko, L. Chang, K. Daiya, C. Deitch, C. Gamber, B. Gault, C.E. Harrison, H.

Hartmann, L. Jacobson, I. Kennelly, P. Kelly, D. Lipscomb, D. Moshenberg, P.M. Palmer, K.

Pemberton, G. Weiss, S. Wolchik, A. Zucker

Columbian College of Arts and Sciences offers two interdisciplinary programs leading to the degrees of Master of Arts in the field of women's studies and Master of Arts in the field of public policy with a concentration in women's studies. Both programs are also available as part of J.D.–M.A. and LL.M.–M.A. joint degrees with the GW Law School. A graduate certificate in women's studies is offered as well. Programs are directed by the Committee on Women's Studies and draw upon faculty from various departments within the University and resource persons in the community.

The women's studies programs examine and integrate the contributions of established academic disciplines to provide an understanding of the historical and contemporary role and status of women, and to provide training necessary to evaluate and formulate equitable public policy for women. Each student will work closely with an advisor in designing a program to meet individual research interests and professional goals. Prospective degree candidates should consult with the director of the Women's Studies Program.

Master of Arts in the field of women's studies and Master of Arts in the field of public policy with a concentration in women's studies—Prerequisite: a bachelor's degree from an accredited college or university.

Required: the general requirements stated under Columbian College of Arts and Sciences, and 36 credit hours of course work, with or without a thesis. Policy-oriented students take WStu 221, 240, and 220, plus four courses in the public policy core (PSc 203, 229; Econ 217; and an approved statistical methods course) and 9 hours of electives. Those pursuing the Master of Arts in the field of women's studies must take WStu 220, 221, and either 225 or an approved alternative; 12 credit hours in one other discipline (history, literature, economics, philosophy, religion, anthropology, or sociology); and 9 hours of electives. With permission, other

disciplinary or topical concentrations may be selected. All students take a final 6 hours chosen from WStu 299–300, or 283 and 295. All candidates are required to pass a Master's Comprehensive Examination.

The M.A. program in the field of public policy is affiliated with the School of Public Policy and Public Administration.

Note: Excluding students enrolled in the Women's Studies Program, completion of WStu 120 and 125 or equivalent, or permission of instructor, is prerequisite to all graduate-level women's studies courses.

220 Fundamentals of Feminist Theory (3) Lynch and Staff

A survey of historical theories significant to feminist thought, such as liberalism, socialism, evolution, psychoanalysis, and gendered spheres of social action. How these theories were revived and revised by the Second Wave of feminism since the 1960s. Brief examination of postmodernist and Third Wave feminist theorizing. (Fall)

221 Research Issues in Women's Studies (3) Deitch

Analysis of the contribution of feminist or gender-relations perspectives from humanities and social science disciplines to the issues and methods of social research and social policy and practice. Topics include a review of feminist frameworks, a critique and re-evaluation of traditional academic disciplines, and analysis of current research on and for women. (Fall)

225 Contemporary Feminist Theory (3) Staff

Developments in feminist theory in the past 20 years, with a primary focus on American feminism and some consideration of European and Third World thought.

- 230 **Global Feminisms (3)** Staff
The individuals, groups, and policies that shape global agenda for women; local and international fora in which global feminisms are forged.
- 238 **Feminist Ethics and Policy Implications (3)** Weiss
Same as Phil 238.
- 240 **Women and Public Policy (3)** Harrison, Deitch
Analysis of gender-related U.S. policy issues, such as domestic violence, military service, abortion rights, equal employment opportunity, child and dependent care, welfare, social security, and international development assistance. (Spring)
- 241 **Women and the Law (3)** Harrison
Legal status of women in the United States on both the federal and state levels.
Emphasis on constitutional equality, employment law, family law, reproduction and sexuality, and the criminal justice system. (Fall)
- 251 **Women and Writing (3)** Staff
Same as Engl 251.
- 257 **Gender and Sexuality (3)** Staff
Same as Anth 257.
- 265 **Women, Welfare, and Poverty (3)** Deitch, Harrison
Examination of how the causes and consequences of poverty differ for women and men; how race, class, and gender shape policy responses to poverty. The history of family assistance policy in the United States and the impact of various welfare reform efforts. Same as Soc 265. (Fall)
- 266 **Gender and Criminal Justice (3)** Staff

Same as Soc 266.

268 **Race, Gender, and Class (3)**

Deitch, Kennelly

Same as Soc 268.

270 **Seminar: Selected Topics (3)**

Staff

Investigation of a current policy issue of particular concern to women, or consideration of women's status in a particular social system. Topics have included women and health; sexualities; women and Judaism; black women; gender, race, and class. May be repeated for credit. (Fall and spring)

273 **Readings on Women in American History (3)**

Harrison

Same as AmSt/Hist 273.

275 **Women and Health (3)**

Zucker

Theoretical and empirical analyses of women's health: how women's health is constructed by medical, psychological, and critical theorists; how sexism, racism, and classism contribute to women's health problems; and identification of conditions that lead to optimal health and well-being. Same as Psyc 275.

280 **Independent Study (3)**

Staff

May be repeated for credit. Arrangements must be made with sponsoring faculty member prior to registration.

283 **Practicum in Women's Studies (3 to 6)**

Deitch

Study of the changing status of women through supervised assignment to public and private agencies engaged in policymaking, education, political action, and research.

Placement arrangements must be made the semester prior to registration;

departmental permission is required. May be repeated for credit to a maximum of 6 credits. (Spring)

295 **Independent Research in Women's Studies** (arr.) Staff

Individual library or field research. Arrangements must be made with the sponsoring faculty member prior to registration; a written proposal is required.

299–300 **Thesis Research** (3–3) Staff

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DEGREES OFFERED BY THE GEORGE WASHINGTON UNIVERSITY

Columbian College of Arts and Sciences: Bachelor of Arts (B.A.), Bachelor of Fine Arts (B.F.A.), Bachelor of Science (B.S.), Master of Arts (M.A.), Master of Fine Arts (M.F.A.), Master of Forensic Sciences (M.F.S.), Master of Public Administration (M.P.A.), Master of Public Policy (M.P.P.), Master of Science (M.S.), Master of Philosophy (M.Phil.), Doctor of Philosophy (Ph.D.), and Doctor of Psychology (Psy.D.)

School of Medicine and Health Sciences: Bachelor of Science in Health Sciences (B.S.H.S.), Bachelor of Science in Nursing (B.S.N.), Master of Science in Health Sciences (M.S.H.S.), Master of Science in Nursing (M.S.N.), Doctor of Nursing Practice (D.N.P.), Doctor of Physical Therapy (D.P.T.), and Doctor of Medicine (M.D.)

Law School: Juris Doctor (J.D.), Master of Laws (LL.M.), and Doctor of Juridical Science (S.J.D.)

School of Engineering and Applied Science:

Bachelor of Science (B.S.), Bachelor of Arts (B.A.), Master of Science (M.S.), Engineer (Engr.), Applied Scientist (App.Sc.), and Doctor of Philosophy (Ph.D.)

Graduate School of Education and Human Development: Master of Arts in Education and Human Development (M.A.Ed.&H.D.), Master of Arts in Teaching (M.A.T.), Master of Education (M.Ed.), Education Specialist (Ed.S.), and Doctor of Education (Ed.D.)

School of Business: Bachelor of Accountancy (B.Accy.), Bachelor of Business Administration (B.B.A.), Master of Accountancy (M.Accy.), Master of Business Administration (M.B.A.), Master of Science in Finance (M.S.F.), Master of Science in Information Systems Technology (M.S.I.S.T.), Master of Science in Project Management (M.S.P.M.), Master of Tourism Administration (M.T.A.), and Doctor of Philosophy (Ph.D.)

Elliott School of International Affairs: Bachelor of Arts (B.A.), Master of Arts (M.A.), Master of International Policy and Practice (M.I.P.P.), and Master of International Studies (M.I.S.)

School of Public Health and Health Services: Bachelor of Science (B.S.), Master of Science (M.S.), Master of Public Health (M.P.H.), Master of Health Services Administration (M.H.S.A.), Specialist in Health Services Administration (Spec.H.S.A.), and Doctor of Public Health (Dr.P.H.)

College of Professional Studies: Associate in Professional Studies (A.P.S.), Bachelor of Professional Studies (B.P.S.), and Master of Professional Studies (M.P.S.)